"An experimental study to evaluate the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS Bhopal"

Dissertation

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ALL INDIA INSTITUTE OF MEDICAL SCIENCES, BHOPAL

In partial fulfilment of the requirement for the degree of

M.Sc. in Medical Surgical Nursing

(Cardiological/Cardiothoracic Vascular Nursing)

By

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ALL INDIA INSTITUTE OF MEDICAL SCIENCES, BHOPAL

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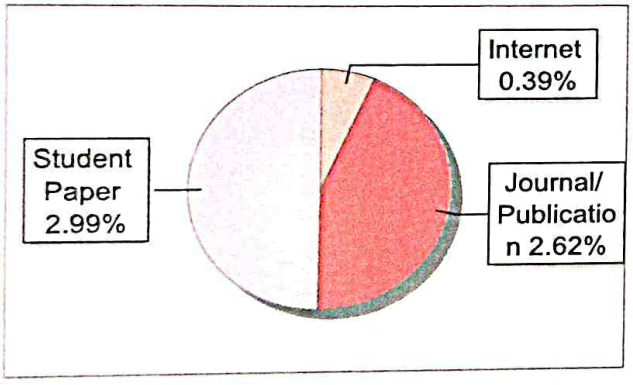

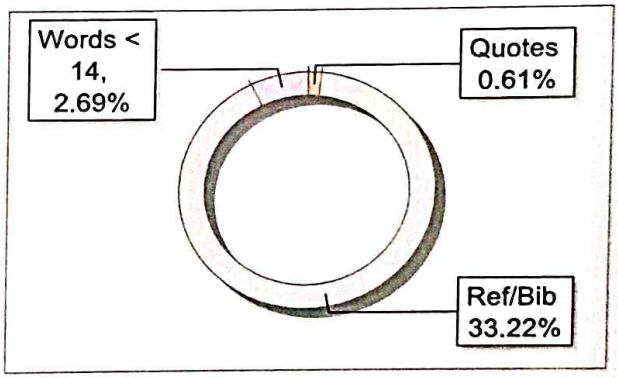

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AIIMS, Bhopal Institutional Human Ethics Committee- Student Research (IHEC-SR) in its 7th meeting held on 22nd February 2023 discussed your proposal titled **"An experimental study to evaluate the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS Bhopal"** and evaluated it for suitability for your dissertation as required for fulfilment of MSc (Nursing).

Following members attended the meeting:

1. Prof. D. K. Pal, Former HoD Community Medicine, GMC, Bhopal.....Chairperson
2. Prof. Rajnish Joshi, Professor of General Medicine, AIIMS, Bhopal.....Member
3. Prof. Amit Agrawal, Professor of Neurosurgery, AIIMS, Bhopal.....Member
4. Dr. Sunita Athawale, Professor of Anatomy, AIIMS, Bhopal.....Member
5. Dr. Girish Bhatt, Addl. Professor of Paediatrics, AIIMS, Bhopal.....Member
6. Dr. Ujjawal Khurana, Assoc. Professor of Pathology, AIIMS, Bhopal.....Member
7. Dr. Ankur Joshi, Assoc. Professor of CFM, AIIMS, Bhopal.....Member
8. Mr. Trivesh Goswami, Law Officer, AIIMS Bhopal,.....Member
9. Dr. Shashank Purwar, Professor of Microbiology, AIIMS, Bhopal.....Member Secretary

The decision of the committee is as follows:

The AIIMS, Bhopal IHEC-SR approves your research protocol. All research related activities must begin only after the date of this approval. The validity of this approval is till two years from the date of issuance. Please submit a closure report / renewal request before expiration of the validity for this approval.

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"Whatever you do, work at it with all your heart, as working for lord not for men."

-Colossian 3:23

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Ms. Dipali Singh

ABSTRACT

ABSTRACT

Introduction-The World Health Organization states that dysrhythmias, specifically ventricular tachycardia and ventricular fibrillation, are the most common conditions that cause death worldwide. Every year, they are responsible for between 70,000 and 90,000 sudden cardiac fatalities. Nurses are the first health care professionals to review the electrocardiogram and anomalies which requires immediate treatment. The present study was aimed to assessing the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers.

Materials And Methods-A quasi experimental study was carried out at AIIMS Bhopal. 100 nursing officers were selected and allocated in experimental and control group, A sixty min nurse led intervention (lecture cum discussion, PowerPoint and information booklet) given to the nursing officers regarding knowledge on electrocardiogram interpretation of cardiac arrhythmias. Data was collected using self-structured knowledge questionnaire for assessing knowledge before and after intervention.

Result- Out of 100 participants before intervention in experimental group 2 (4%) had inadequate knowledge ,46 (92%) had moderate knowledge, 2 (4%) had adequate knowledge and in control group 4 (8%) had inadequate knowledge, 42 (84.0%) had moderate knowledge and 4 (8%) had inadequate knowledge. After intervention mean knowledge score increased from 10.76 to 16.94 ($p<0.001$) in experimental group.

Discussion- Nurse led intervention found to be effective in increasing knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS Bhopal. Similar findings have been reported by several other studies indicating a need for nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers.

Conclusion-Nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias found to be effective in increasing knowledge of electrocardiogram interpretation of cardiac arrhythmias among nursing officers. It can be a part of targeted intervention as intention focused, cost effective training. By expanding this intervention health care professionals can manage various life-threatening cardiac conditions.

Keywords -Nurse Led Intervention, Cardiac Arrhythmias, Electrocardiogram Interpretation, Knowledge, Nursing Officer.

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13.	Participation information sheet (Hindi)
14.	Informed consent form (Hindi and English)
15.	Master data sheet

LIST OF ABBREVIATIONS

Abbreviations	Full Form
ECG	Electrocardiogram
AIIMS	All India Institute of Medical Sciences
CVI	Content validity index
IHEC -SR	Institutional ethic committee –Student research
M.Sc.	Master of Science
EMS	Emergency Medical Services
WHO	World health organization
SD	Standard deviation
PPT	PowerPoint
STP	Structured teaching program
ICU	Intensive care unit

CHAPTER 1
INTRODUCTION

Chapter I
INTRODUCTION

BACKGROUND

Cardiac Arrhythmias

The term "cardiac arrhythmia" comes from the Latin "cardiac," which means "heart," "A," which means "disturbance, distortion, or absence," and "rhythmia," which means "to measure continuous normal rhythm. [1]

More than a thousand lives are lost every day due to life-threatening cardiac dysrhythmias, or arrhythmias, which can result in rapid cardiac death.

The World Health Organization (WHO) estimates that heart disease claims the lives of approximately 17.5 million people globally. In the competition, Indians are once again outpacing Americans and other participants. According to WHO forecasts, roughly 60% of cardiac patients worldwide will be Indian. [1]

The human heart contracts approximately 2.5 billion times during the average person’s lifespan; this is accomplished by the cardiac conduction system, which consists of the sinoatrial (SA) node, atrioventricular (AV) junction and AV node, a bundle of His and Purkinje fibers. The Normal conduction of a cardiac impulse is generated in the sinus (SA) node which is the natural pacemaker of the heart and the only normal rhythm of the heart is a normal sinus rhythm.

A deviation from the usual heart rhythm or pace is called a cardiac arrhythmia. It is caused by abnormalities in the generation, conduction or both of electrical impulses. The heart's incapacity to function and pump blood effectively affects the perfusion and oxygenation of vital organs and peripheral tissues. This lowers the cardiac output to these tissues, which may cause an organ to malfunction or fail. Examples of arrhythmias that originate in the ventricles and/or atrial and range from asymptomatic rhythm to

symptomatic lethal rhythm include atrial flutter, atrial fibrillation, ventricular tachycardia (VT), ventricular fibrillation (VF), pulseless ventricular tachycardia, pulseless electrical activity, complete heart block, asystole, and torsade de point rhythm. [2]

Arrhythmias, which are excessively fast or abnormally slow heart beats, can be caused by a variety of cardiac disorders that affect the regular contract-relax cycle. These ailments cause the heart to pump blood less efficiently, which reduces the amount that reaches the brain and other important organs. The individual may have giddiness, chest pain, or possibly pass away unexpectedly. [3]

Heart arrhythmias have a complex etiology that can include genetics, ischemic heart disease, structural heart disease, electrolyte imbalances, and other underlying medical disorders. Arrhythmias can be characterized according to their length, cause, or effect on heart function. They can present as either atrial or ventricular.

About 50% of coronary artery disease related deaths are caused by ventricular fibrillation, which is frequently the initial manifestation of coronary artery disease and frequently occurs during the first hour following the start of an acute MI or coronary syndrome.[4]

Most of the myocardial infarction deaths occur due to arrhythmias. Arrhythmia is one of the most common threats in patients with acute myocardial infarction. Hypotension, cardiac failure, and shock will be the drastic changes related to arrhythmias. The occurrence of arrhythmia and unexpected cardiac death in United States is a coronary artery disease and about 3, 00,000 people die of this cause every year. The mortality rate can be reduced significantly if arrhythmia is diagnosed and treated at its initial stage. [4]

The World Health Organization states that dysrhythmias, specifically ventricular tachycardia and ventricular fibrillation, are the most common conditions that cause death worldwide. Every year, they are responsible for between 70,000 and 90,000 sudden cardiac fatalities. [5]

Electrocardiogram

At a Dutch medical society meeting in 1893, William Einthoven first used the word "electrocardiogram." For his lifetime accomplishment of discovering the electrocardiogram's mechanism, Einthoven was awarded the Nobel Prize in 1924.

An average heart beats with a regular rhythm. A person's heartbeat varies from person to person and within person based on a multitude of factors. A typical electrocardiogram signal is divided into segments that include wave types like as P, Q, R, S, T, and U. The QRS complex, which is made up of the Q, R, and S waves—the Q wave being a bigger upward deflection, the R wave being a peak, and the S wave being a downward movement—usually starts with a downward movement. The length of time the wave takes to travel from the sinus node to the ventricles is indicated by the PR segment or interval. The time period between consecutive QRS complexes is represented by the RR interval, which is used to determine heart rate.[6]

Electrocardiography (ECG) is a routine, low-cost, safe test that aids in the diagnosis of arrhythmia. Cardiologists have long used the Electrocardiogram (ECG) as a reliable method for identifying heart conditions in their patients. By applying surface electrodes to the patient's limbs or chest, it is simple to capture the electrical representation of the heart's contractile activity. In the practice of medicine, it is one of the most well recognized and utilized signs.[7]

When a patient presents with symptoms of acute coronary syndrome (ACS), the American College of Cardiology (ACC/AHA) recommends that an electrocardiogram be taken and evaluated within 10 minutes of referral. [8]

Electrocardiogram monitoring in a hospital setting now includes diagnosing complex cardiac arrhythmias, myocardial ischemia, and prolonged QT interval in addition to basic heart rate and rhythm interpretation. Electrocardiogram monitoring needs to be done carefully. Inadequate technique can lead to several negative outcomes such as misinterpreting cardiac arrhythmias, making a false diagnosis, squandering investigations, and mismanaging the patient.

Nurses are the first medical professionals to review the electrocardiogram readings and spot any anomalies that might need to be addressed right away. In order to handle electrocardiogram abnormalities, activate the proper emergency health teams, or start first-line treatments, nurses must be capable of doing an initial evaluation, identifying problems early, and acting quickly. The prompt and precise assessment of cardiac arrhythmias by nurses has been associated with safe procedures and favorable patient outcomes. [9]

NEED OF THE STUDY

A serious condition called cardiac arrhythmias can put more strain on the heart. This requires accurate and prompt action. The most crucial people to have knowledge about dysrhythmia interpretation are nurses. Acquiring understanding of dysrhythmia interpretation could aid nurses in averting death and serious illness. Nurses will continue to play an important role in the initial assessment and management of patient. Although the electrocardiogram is not only diagnostic tool in the diagnosis of related diseases. The benchmark door to balloon time of 90 min is highly dependent on quick and accurate electrocardiogram interpretation.[5]

A study by **Faramand et al. (2019)** showed that emergency medical services personnel compared with emergency nurses had lower competencies detecting electrocardiogram changes related to Myocardial Infarctions (MI). A review of the literature reports that despite the ubiquity of the electrocardiogram, in general healthcare professionals have inadequate electrocardiogram interpretation competency.[8]

Diverse degrees of nurse competency in the interpretation and management of arrhythmias have been found in numerous research carried out globally. For instance, research found that emergency nurses had poor proficiency in interpreting electrocardiogram. A significant percentage of bedside nurses (61%) in a Turkish study stated they were unaware of the proper electrocardiogram monitoring technique or how to identify arrhythmias. Another study that looked into nurses' understanding of early interventional treatment for patients with ventricular tachycardia and was carried out in Iraq revealed that nurses lacked the skills necessary to interpret an electrocardiogram and identify arrhythmias associated with ventricular tachycardia. [3]

On the other hand, strong competency scores in electrocardiogram interpretation were observed in another research. For instance, a 2017 study found that emergency department nurses had a high level of electrocardiogram expertise. Additionally, they discovered that knowledge was impacted by prior five years of electrocardiogram training but not by job experience or the type of hospital. [3]

All departments have nurses that provide care for the patients and constantly check on their conditions. One of the key tools for keeping an eye on heart health is the electrocardiogram. A nurse's ability to read an electrocardiogram and apply newly gained knowledge to save a patient's life is essential.[10]

Thus, interpretation of the electrocardiogram is essential for all nurses, but for many nurses, the electrocardiogram can be a confusing and complex subject therefore the present study is being undertaken by the researcher.

RESEARCH PROBLEM

An experimental study to evaluate the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS, Bhopal.

AIM OF THE STUDY

The aim of the study was to evaluate the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS, Bhopal.

RESEARCH QUESTION

a) What is the knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers?
b) What is the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS, Bhopal?
c) Is there any association between level of pretest knowledge regarding electrocardiogram interpretation of cardiac arrhythmias with selected demographic variables among nursing officers?

OBJECTIVES

1. To assess the pretest knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers among nursing officers at AIIMS Bhopal.
2. To find out the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS, Bhopal.
3. To find out the association between level of pre-test knowledge regarding electrocardiogram interpretation of cardiac arrhythmias with selected demographic variables.

HYPOTHESIS

N_{01} -there is no significant difference in pretest and posttest knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS, Bhopal at 0.05 level of significance.

ASSUMPTIONS

1. Nursing officers will have some previous knowledge regarding electrocardiogram interpretation of cardiac arrhythmias.
2. Nurse led intervention will have some effect on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias.
3. The data filled by the participants is accurate.

DELIMITATIONS

The study is delimited to nursing officers employed at AIIMS Bhopal.

OPERATIONAL DEFINITIONS

Knowledge- It refers to the state of knowing interpretation of electrocardiogram of about cardiac arrhythmias as assessed by structured knowledge questionnaire

Nurse led intervention- It will be 60 min lecture cum discussion using PowerPoint slides regarding electrocardiogram interpretation of cardiac arrhythmias and followed by giving out an information booklet.

CONCEPTUAL FRAMEWORK

The conceptual framework for this study is based on general system theory with input, process, output and feedback, as introduced by Ludwig Von Bertalanffy (1968)[1]

According to this theory, a system is a group of elements that interact with one another in order to achieve the goal. An individual is a system because he or she receives input from the environment. This input when processed provides an output.

All living system are open, in that there is a continual exchange of matters, energy and information. The system is cyclical in nature and continuous to be so, as long as the four parts (input, process, output and feedback) keep interacting. If there is change in any of these parts there will be change in all the parts. Feedback from within the system or from the environment provides information, which helps the system to determine whether it is meeting its goal or not.

- **Input:** Input consist of information, material or energy that enters the system. In present study family members of cardiac patient are a system with input from self and those acquired from the environment. These inputs include nursing officers, socio demographic data including age, gender, year of experience, currently working unit, taking ECG for patient, educational level, ECG interpretation training, education resources which may influence the knowledge of nursing officers towards electrocardiogram interpretation of cardiac arrhythmias.

- **Process**- after the input is absorbed by the system, kit is processed in a way useful to the system. Here the researcher assessed the nursing officers through self-structured knowledge questionnaire for knowledge.
- **Output**- output from a system is an energy; matter of information disposed of by the system as a result of its process. In this study the output were depicted as follows:

➢ Favorable outcome- knowledge gain

➢ Unfavorable outcome- inadequate knowledge

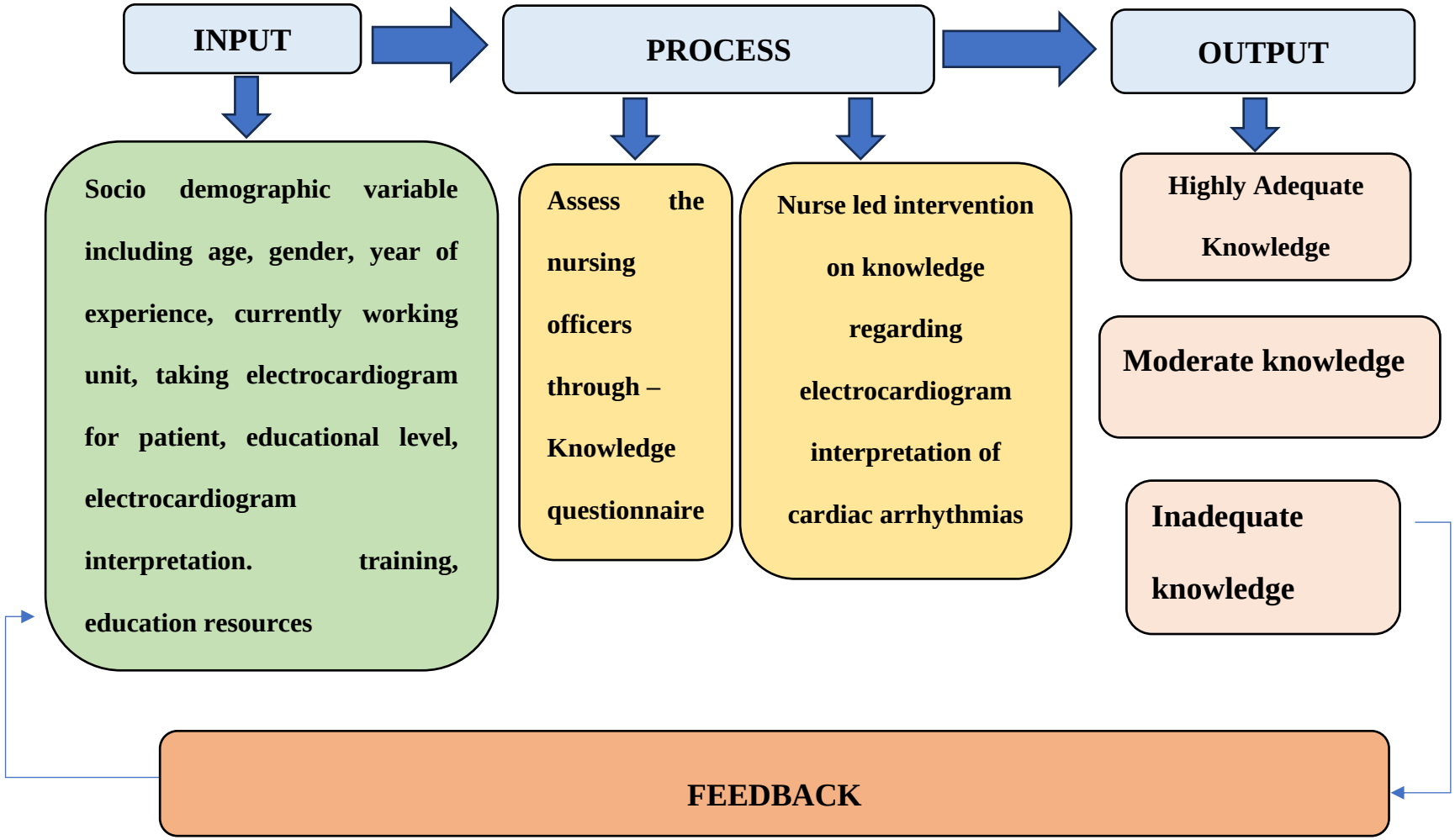
INPUT
PROCESS
OUTPUT
Socio demographic variable including age, gender, year of experience, currently working unit, taking electrocardiogram for patient, educational level, electrocardiogram interpretation. training, education resources
Assess the nursing officers through – Knowledge questionnaire
Nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias
Highly Adequate Knowledge
Moderate knowledge
Inadequate knowledge
FEEDBACK

Figure 1: Conceptual Framework Based on Ludwig von Bertalanffy's General System Theory

SUMMARY

This chapter introduces the topic, specifies the need of study, aim of study, objectives, hypothesis, assumptions, delimitations, operational definitions and conceptual framework of the study.

CHAPTER 2

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

Review of literature is an important aspect of any research project from beginning to end. It gives greater insight into the problem, helps in selecting methodology, developing tool and analyzing data. For the present study an extensive review of literature had done using key words such as structured program, effectiveness, knowledge, electrocardiogram interpretation, cardiac arrhythmias, nursing officers with Boolean operators AND and OR with the help of search engines PubMed, CINHAL, google scholar.

Ahmed R et al. in year (2023) conducted quasi-experimental study was to evaluate the effect of competency training program on intensive care nurse performance regarding electrocardiogram interpretation among 60 nurses. In this study quasi experimental research design with purposive sampling technique is used and knowledge is assessed using self-structured knowledge questionnaire and electrocardiogram practical competency checklist was used to evaluate the performance. The study reveals that 85% of the nurses had improved to a satisfactory level; however, this number dropped to 80% on the follow-up test, compared to 13.3% on the pre-test. The study concluded that the study nurses' overall knowledge and practices regarding electrocardiogram interpretation has improved after the intervention. [11]

Khan S, Tariq S, Rizwan R et al. in year (2023) conducted an experimental to evaluate the effect of educational program on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias on nurses knowledge in critical care units A quasi-experimental design was applied and 113 nurses were selected using a convenient sampling technique in which 116 were female and 23 were male Self – structured knowledge questionnaire was used to assess nurses knowledge regarding cardiac arrhythmias Results**:** The studied sample demonstrated a significantly higher level of

knowledge (P 0.001), after intervention .The study concluded that After the education program was put into place, nurses' understanding of cardiac arrest improved.[7]

Kuriakose JR, Mary SH, Prabha AS et al. in (2022) conducted a pre-experimental study with one group pretest posttest to evaluate the effectiveness of structured teaching program on knowledge regarding electrocardiogram interpretation among student nurses. 60 BSc nursing student participated in this study and self-structured knowledge questionnaire is used to assess the knowledge. The study concluded that second-year B.Sc. nursing students' knowledge was effectively increased by the organized teaching program. Nursing students must rigorously update their knowledge and proficiency in electrocardiogram interpretation on a regular basis through recurrent instruction, demonstrations, and evaluations. [12]

Wen H, Hong M, Chen F et al. in year (2022) conducted an experimental study to assess how trainee nurses interpreted arrhythmias in electrocardiograms using the Cardiac Rhythm Identification for Simple People method and flipped classroom methodology. This study involved two groups, a quantitative questionnaire survey, and three electrocardiogram interpretation tests. It was a randomized controlled trial. There were 120 trainee nurses enrolled in the Department of Cardiology overall. Results reveals that Following training, the experimental group's electrocardiogram test results showed a considerable increase above the control groups. The experimental group's electrocardiogram test results were still higher six months later. The experimental group showed considerably higher levels of enthusiasm for self-learning, comprehension of the material being taught, satisfaction with the manner and effectiveness of the instruction, and interest in learning electrocardiogram. The study concluded that for trainee nurses learning electrocardiogram, the Cardiac Rhythm Identification for Simple People method in conjunction with the flipped classroom approach is a novel and useful option worth

attempting. [27]

Umar NS in (2021) conducted a quasi-experimental study Umar NS in May 2021 with one group pretest and posttest design to assess the effectiveness of structured teaching program on knowledge regarding cardiac arrhythmias and management among student nurses of Adesh university Punjab 50 student nurses completed a questionnaire to provide data. A pre-test was administered before and after the STP was delivered to the same group, and a post-test was administered following seven days of instruction. The result revealed that there is a signification difference calculated $p<0.002$. showing that structured teaching program was highly effective. The study also shows that there was no association between level of pretest knowledge and socio demographic variables. [1]

Agnibhoj P. in year 2021 conducted an experimental study to evaluate the effectiveness of virtual teaching on knowledge regarding electrocardiogram interpretation among nursing students. For this study, 100 student nurses were easily recruited from the chosen nursing colleges using a pre-experimental, one group pre-test/post-test research design. For data collection, a structured knowledge questionnaire with 30 items was created using Google Forms. The Zoom internet platform was used for the virtual training. After a virtual training session and an online pre-test administered via Google Form, a post-test was administered on the seventh day following the training. On the post-test, however, just 8% had low knowledge, 63 percent had moderate knowledge, and 29 percent had strong knowledge. Significantly ($p<0.05$) improved with virtual training. [13]

Sakhardande DVD in year (2021) conducted a comparative study to evaluate the effectiveness of demonstration versus video assisted teaching on knowledge and practice regarding electrocardiogram among staff nurses working in critical care unit. comparative experimental research design with one group demonstration pretest and posttest and one group video assisted teaching ore test and posttest with control group

was used and 60 samples were selected using non probability convenient sampling technique and self-structured knowledge questionnaire and observation checklist was used as a tool for assessing knowledge and practice regarding electrocardiogram among staff nurses. The study revealed that there was a significant difference in the effectiveness of demonstration and video assisted teaching when it came to knowledge about electrocardiograms However, there was no significant difference in the effectiveness of demonstration and video assisted teaching when it came to practice regarding electrocardiograms. The study demonstrated the efficacy of video-assisted instruction and demonstration in improving the knowledge and techniques of staff nurses in the critical care unit about electrocardiograms. [14]

Agashe N. in year 2021 conducted a quasi-experimental study to evaluate the effectiveness of lecture method VS information booklet on knowledge regarding electrocardiogram interpretation among staff nurses. quantitative quasi experimental research design was used. 150 samples were recruited in the study using non probability convenient sampling technique. Self-structured knowledge questionnaire was used to assess knowledge containing 35 questions of electrocardiogram interpretation among staff nurses. The results revealed that there was a statistically significant difference between the lecture technique and information booklet score pre- and post-test levels. The study concluded lecture method was more effective than information booklet in increasing the knowledge regarding electrocardiogram interpretation among staff nurses.[10]

Chen Y, Nasrawi D, Massey D, Johnston ANB et al. in year (2021) conducted a cross sectional study titled final year nursing students' foundational knowledge and self – assessed confidence in interpreting cardiac arrhythmias. The aim of the study was to examine final-year nursing students' foundational knowledge and self-assessed

confidence in interpreting cardiac arrhythmias. Cross sectional study design was used and the study was conducted at two Australian universities. Final year nursing student was recruited and an online survey was adopted to examine final-year nursing students' foundational knowledge and their self-assessed confidence when interpreting cardiac rhythms. Results reveals that a total of 114 people, or 22% of the sample, completed the surveys. In general, self-reported confidence levels were lower than arrhythmia interpretation accuracy rates. Even though a large number of participants admitted that understanding arrhythmia interpretation was tough and demanding, the majority of them had favorable opinions and desired to learn more. The study concluded that in order to improve the foundational knowledge and confidence of final-year nursing students in interpreting cardiac arrhythmias and improving patient safety, nursing curricula must be supported and strategies for standardizing educational electrocardiogram interpretation programs must be put into place. [30]

Rahimpour M, Shahbazi S, Ghafourifard M, et al. in year (2020) conducted a cross sectional descriptive and comparative study to compare electrocardiogram interpretation competency among emergency nurses and emergency medical services personnel. In the northwest of Iran, 170 participants were enlisted for the study (105 emergency nurses and 65 emergency medical services workers The study concluded that compared to pre-hospital emergency medical staff, hospital emergency nurses had more qualifications to read the ECG ($p = .792$ and β (SE)) = 0.22 (0.84). Emergency nurses' and emergency medical services personnel's electrocardiogram interpretation competency must be developed and enhanced by active participation in electrocardiogram interpretation and regular ongoing education. [8]

Tavan H, Norouzi S, Shohani M et al. in year (2020) conducted a quasi-experimental study to assess the effect of educational video and simulator software on knowledge regarding electrocardiogram interpretation on cardiac arrhythmias among nurses, 22 in experienced nurses were chosen using the census methodology. Assessments were conducted both prior to and following cardiac arrhythmia educational sessions. Two of the interventions were in-person instruction and the use of simulator software. Data was gathered using a questionnaire consisting of 20 questions about cardiac. Results revealed that roughly 6-score rise after the intervention. The study concluded that before and after training, arrhythmia scores varied; after the intervention, the mean scores increased and the rate of arrhythmia identification increased.[15]

Philip NG, Chauhan K. in year (2020) conducted a pre-experimental study with one group pretest posttest to evaluate the effectiveness of planned teaching program on knowledge regarding electrocardiogram interpretation in early detection of cardiac arrhythmias among the student nurses 50 student nurses were selected and self-structured knowledge questionnaire. Maximum marks war 42 and minimum marks was 0. Results revealed that there is 39.4% increase in knowledge among students after administration of planned teaching program which indicated the effectiveness of program. The study also reveals that there is no association between pretest knowledge and socio demographic variable. [4]

Pareek S, Bisht M in year (2020) conducted a pre-experimental study with a single group pre-test post-test design was chosen to evaluate how well computer simulated instruction affected electrocardiogram interpretation among nursing students. At Miranda College of Nursing in Bangalore, 60 B. Sc. Nursing students in their third and fourth years participated in the study. Purposive sampling with non-probability was used

to choose the samples. Findings: Of the participants in this study, half are between the ages of 19 and 22. Eighty-seven percent of the respondents were women. 73% of the respondents identified as Hindu, 23% as Christian, and 4% as Muslim. The post-test mean knowledge score was 30.88 with a paired "t" test value of 31.894, significant at the 0.05 levels, whereas the pretest mean knowledge score was 17.33. The degree of knowledge and faith, the father's educational background, and the information source all significantly correlated. [25]

Singhal G, Salvi S in year (2019) conducted an experimental study to evaluate the effectiveness of planned teaching program on knowledge regarding identification and emergency management of cardiac arrhythmias among staff nurses. Quantitative and one group pretest and post research design was used and 110 nurses were recruited using random sampling method technique. Semi structured questionnaire was used as a tool for data collection. Result- it was found data planned teaching program was effective in increasing knowledge regarding identification and emergency management of cardiac arrhythmias at $p<0.000$ level of significance. [21]

Sasikala K in year (2019) conducted an experimental study to evaluate the effect of structured teaching program on knowledge, interpretation of electrocardiogram among critical care nurses, at selected ward of Sri Ramkrishna Hospital, Coimbatore. One group pretest posttest experimental design was used. 30 nurses were selected for the study. Data analysis was done using descriptive and inferential statistics. The results reveal that structured teaching program was effective in increasing knowledge, interpretation of electrocardiogram among critical nurses at selected ward of Sri Ramkrishna Hospital, Coimbatore. [24]

Jacob J, Tryambake R, Jamdade et al.in year (2018) conducted a pre-experimental study to evaluate the effectiveness of planned teaching program on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias and its management among staff nurses in Pune City. Pre experimental one group pretest posttest design was used 100 samples was recruited for the study , self-structured knowledge questionnaire was used to assess the knowledge and the study reveals that 64% of samples had average knowledge and after the administration of planned teaching program post test scores reveals that 88% of samples had good knowledge regarding electrocardiogram interpretation of cardiac arrhythmias and its management .The study also reveals that there was no significant association between pretest scores and sociodemographic variable.[16]

Ranjana in year (2018) conducted a pre-experimental study to evaluate the effectiveness of structured teaching program on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing students. Pre experimental one group pretest posttest research design was used and 60 BSc nursing students were selected using convenient sampling technique. self-structured knowledge questionnaire was used to assess the knowledge on electrocardiogram interpretation of cardiac arrhythmias. The results There is a 24.6% difference in knowledge between the pre- and post-tests. The study also reveals that there was no significant association of pretest knowledge with selected demographic variable. The study concluded that Samples had average understanding of all area of electrocardiogram prior to the implementation of structured teaching program.[17]

Deepak K S in year (2017) conducted a pre-experimental study to evaluate the impact of a structured education program on participants' understanding of "electrocardiogram" students studying nursing. The study was carried out at Indore's Nursing College. There

were thirty samples in all. Pre experimental research design was used and non-probability purposive sampling technique was employed. According to this study, the majority of samples had bad knowledge (63%) and only a small percentage had strong knowledge (7%), with the very poor range having knowledge levels as high as 30%. Additionally, not a single respondent fell into the excellent or very good category of expertise. This study reveals that majority of the nursing students have adequate knowledge and regarding electrocardiogram after implementation of structured teaching program in Indore nursing college at Indore.[22]

V.M. A, Gowri, Rani J in year (2016) conducted an experimental study to assess the effectiveness of video therapy on level of knowledge regarding identification and management of cardiac arrhythmias and to compare the effectiveness of video therapy on level of knowledge regarding identification and management of cardiac arrhythmias. Design: True experimental - randomized block design. Participants: 30 nurses who were working at selected hospitals, who were fulfilling the eligibility requirements. Methods: A basic random sample procedure was used to choose 30 nurses. To evaluate the degree of knowledge, a structured tool for the diagnosis and treatment of cardiac arrhythmias was utilized. The post-test results of the nurses in the experimental group did not significantly correlate with the demographic characteristics that were chosen. In conclusion, nurses' understanding of the detection and treatment of specific cardiac arrhythmias was improved most by the video-assisted teaching. [18]

Zeng R, Yue RZ, Tan CY et al. in year (2015) conducted an experimental study tittle new idea for teaching electrocardiogram interpretation and improving classroom teaching content The true efficacy of electrocardiogram learning by students was to be determined using prospective randomized controlled research. A regular teaching group and an innovative teaching group, each with 100 participants, were randomly assigned to

200 pupils. While the instructors in the innovative teaching group were trained in accordance with the suggested teaching approach and curriculum, the teachers in the traditional teaching group followed the conventional teaching outline. In the last semester, each student completed an exam that required them to analyze twenty electrocardiograms from actual clinical cases and turn in their electrocardiogram reports. For the standard teaching group, the average electrocardiogram reading took 32 minutes, while for the creative teaching group, it took only 18 minutes. The inventive teaching group outperformed the typical instruction group, with an average electrocardiogram accuracy of 77% compared to 43% for the former. The result concluded that the graphics-sequence memory strategy worked well for teaching electrocardiogram.[29]

Tubaishat A, Tawalbeh L. in a year (2014) conducted an experimental study to evaluate the effectiveness of simulation-based teaching on the acquisition and retention of arrhythmia related knowledge among nursing student. A pretest-posttest design with randomization and control was employed. Nursing students were divided into two groups at random: the experimental group (n = 47) attended cardiac arrhythmia simulation scenarios, while the control group (n = 44) attended a conventional lecture on the same subject. The mean knowledge score for both groups was considerably greater in the posttest than it was at the pretest, according to a paired t test. On the first and second posttests, however, participants in the experimental group showed a notably higher level of understanding of cardiac arrhythmia in comparison to those in the control group. As a result, simulation is better and greatly increases students' understanding of arrhythmia.[19]

Xanthos T in a year (2014) conducted an experimental study to compare the six – stage method for instructing primary cardiac arrhythmias interpretation to student without basic electrocardiogram knowledge with a descriptive teaching method in a single educational intervention. Randomized control research design was used 134 students

were selected for the study. The results reveals that there was no significant difference between the two teaching methods. Study concluded that six – stage method was effective in increasing knowledge of student in interpreting cardiac arrhythmias. [23]

Zhang H, Hsu LL in (2013) conducted a quasi-experimental study to evaluate the effectiveness of structured teaching program on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers. The design was quasi-experimental. 52 nurses were enlisted for the study, comprising 23 nurses from an emergency department, 12 nurses from a cardiology department, and 17 nurses from an intensive care unit (ICU). A self-learning manual and a lecture-based educational program were the two teaching strategies employed. A self-structured questionnaire was used to assess the knowledge. Data analysis. The study concluded that Before training, the nurses' varying demographic traits were associated with varying levels of ECG expertise. The nurses' understanding of electrocardiogram was effectively increased by the self-learning handbook material and lecture-based education program. [20]

Tavan H, Norouzi S, Shohani M in year (2013) conducted a quasi-experimental study to ascertain how nurses who work in intensive care units' understanding of electrocardiogram interpretation is affected by educational software called an arrhythmias simulator. Techniques: 73 intensive care unit and critical care unit nurses from two Seyedoshohada and Taleghani hospitals in Urmia participated in this quasi-experimental study. The nurses were randomly assigned to two groups: the intervention group and the control group. self-structured questionnaire was used as a tool for data collection. The results reveal that there was a significant statistical difference between the post-training scores in the two groups was found using the independent statistical T-test (p=0/004). Additionally, a paired t-test comparison of the intragroup average scores showed significant differences in each group's before and after scores (p<0/005). In

contrast, the intervention group's mean difference between pre- and post-scores was greater. Conclusion- The use of educational software of arrhythmias simulator causes more improvement of the knowledge of nurses in arrhythmias interpretation. [26]

Zhang H, Hsu LL in year (2012) conducted a quasi-experimental study to evaluate the effect of a continuing education program on nurses' understanding of 12-lead electrocardiogram interpretation. The design of the investigation was quasi-experimental. 52 nurses were enlisted for the study, comprising 23 nurses from an emergency department, 12 nurses from a cardiology department, and 17 nurses from an intensive care unit (ICU). A self-learning manual and a lecture-based educational program were the two teaching strategies employed. A questionnaire with questions covering five dimensions was used to as a tool for data collection. Data analysis revealed that before training, nurses in the cardiology department outperformed those in the emergency room and intensive care unit (ICU) in terms of fundamental electrocardiogram knowledge; nurses with two to ten years of experience also performed better on tests. Higher than the pretest scores were the post-test total and domain scores at two weeks, four months, and one month following the lecture-based learning and the presentation of a self-learning electrocardiogram guidebook. The study concluded that the nurses' understanding of electrocardiogram was effectively increased by the self-learning handbook material and lecture-based education program. [28]

SUMMARY

Review of literature is a critical summary of research problem in context or to identify gaps and weakness in prior studies so as to justify a new investigation. It is an extensive, systemic selection of potential sources of previous work, which acquaints the investigation with fact finding work after securitization.

CHAPTER 3

MATERIALS AND METHODS

Chapter III

Materials And Methods

Research methodology is the systematic way of doing the research. It contains statement of problem, objectives of study, methods used for data collection and statistical methods used for analyzing data and logic behind it.

This chapter deals with the description of the methodology adopted by the researcher in this study. The methodology of the research indicates how the study proceeded through various stages and what methods tools and intervention were used by the researcher.

Research Approach

A quantitative research approach was used to accomplish the objectives of study intended to gather data regarding electrocardiogram interpretation on cardiac arrhythmias.

Research Design

The research design used for the study is Quasi Experimental Research Design (non-equivalent control group design with pretest only)

Research Variables

- **Independent variables-**Nurse led intervention is a sixty minutes intervention delivered by the researcher which includes lecture cum discussion, PowerPoint slides and information booklet regarding electrocardiogram interpretation of cardiac arrhythmias.
- **Dependent variables**- knowledge regarding electrocardiogram interpretation of cardiac arrhythmias.

Research Setting

The study was conducted at AIIMS, Bhopal in General ward/Medical ward, Surgical wards, Emergency department, Intensive care unit, others.

Population

In the present study, the population consisted of nursing officers working at AIIMS Bhopal**.**

Sample Size (Annexure 2)

Sample size for the present study was calculated using OpenEpi, Version 3, Software [35] with the mean and standard deviation of previous studies. [10] The parameters assumed in sample size calculation are as follows:

Confidence interval (2 sided) =95%, Power =80%, Ratio of sample size (group2/group1) =1

Mean and standard deviation (group 1) =27.3±4.26, Mean and standard deviation (group 2) =24.4±3.96

Calculated sample size was 70(35 in experimental group and 35 in control group)

Researcher round off the sample size to 100 (50 in each group)

Sampling Technique

The sample was selected by convenient sampling method, those subjects who fulfil the inclusion were included in the study.

Inclusion Criteria

The study includes nursing officers-

- Employed at AIIMS Bhopal.
- Willing to participate.
- Able to read and write English or Hindi.

Exclusion Criteria

The study excludes the nursing officers-

- Not willing to participate
- Not available at the time of data collection

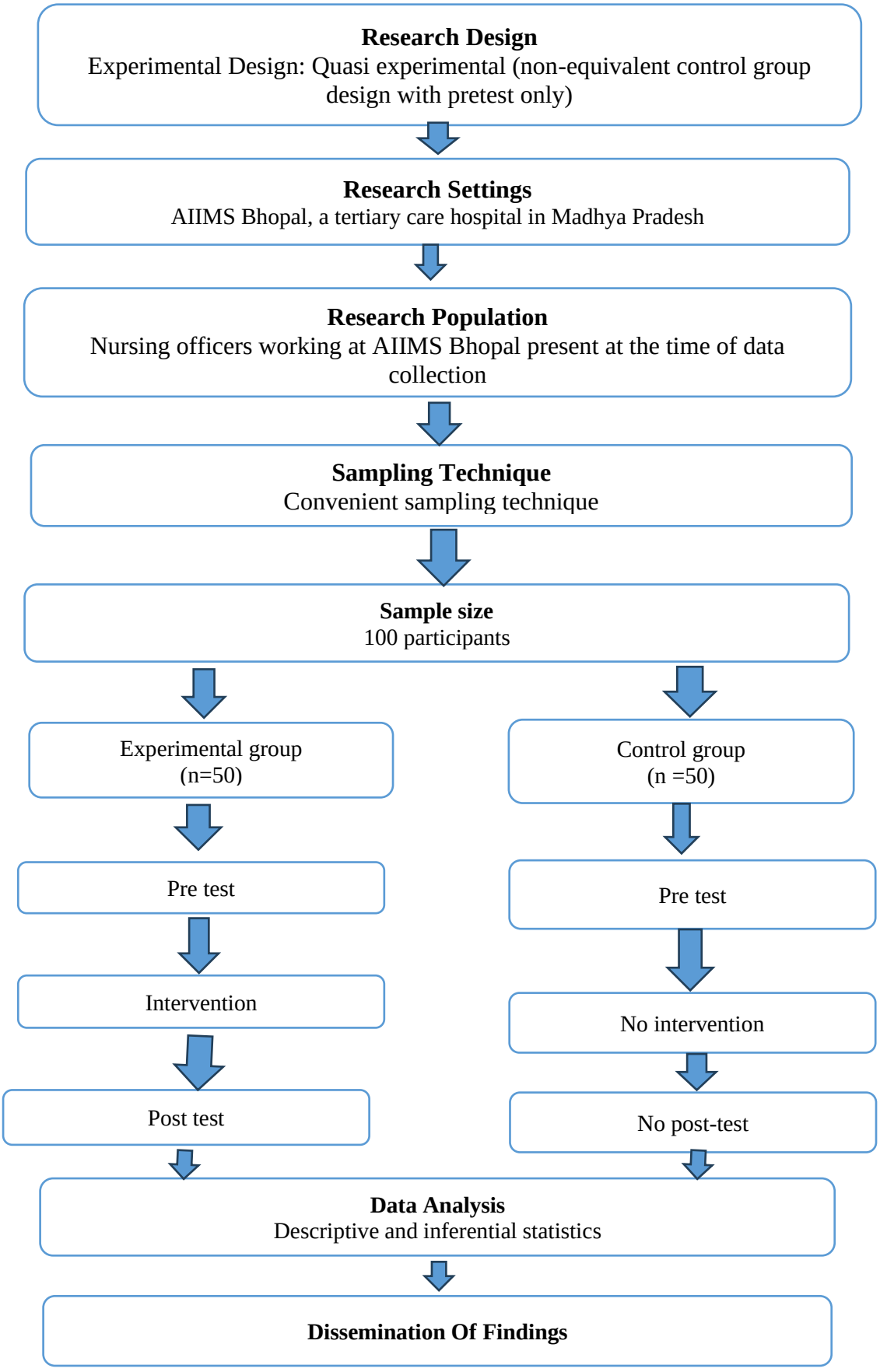

Figure 2: The schematic presentation of methodology

Development Of Tool

The following steps were undertaken in tool development:

- Extensive review of literature on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias.
- Extensive review of literature effect of educational intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias.
- Development of knowledge structured questionnaire for the assessment of effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias.
- Development of socio demographic variable based on literature review.
- Content validation of tool
- Tool modification on the basis of suggestion of experts guide and co-guide
- Tool translation into regional language Hindi and consulted with language expert.
- Reliability of tool
- Finalization of tool

Description Of Tool (Annexure 4)

The researcher planned to administer a self-structured knowledge questionnaire tool that contains the following-

Section A- Socio – demographic variable of nursing officers which includes

Age, Gender, Years of Experience, Currently Working Unit, Educational Level, Electrocardiogram Interpretation Training, Education Resources

Section B- self structured knowledge questionnaire to assess the knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers.

- Contains 20 items with a score 0-1 for each item (incorrect response -0. correct response -1)
- Scoring ranges from 0-20

Criterion Measures

Contains 20 items with score 0-1 for each item (incorrect -0, correct -1)

Scoring ranges from 0-20

Interpretation of score are as follows-

Category	**Score**
Inadequate knowledge	0-6
Moderate knowledge	7-13
Adequate knowledge	14-20

Table 1 Represents Criterion Measures for Scoring Interpretation

Validity Of Tool

Content validity of the tool and intervention protocol was checked.

Procedure for content validity

- Preparing a content validation form
- Selecting a panel of experts
- Conducting content validation
- Reviewing domain and items
- Providing score on each item
- Calculating CVI

Validity Of Tool

Scale content validity index was calculated using both. Average method and universal agreement method.

	S-CVI
Socio Demographic Variable	0.97
Knowledge Structured Questionnaire	0.99
Lesson Plan of Intervention	0.98
Content Of Information Booklet and PowerPoint	0.97

Table 2 Represents Validity of Tool

Tool Translation

- Language validity was ensured by consulting with language expert.
- The Hindi version of research tool for this study was found to be a true and accurate translation of the English version and valid to collect data for research.

Reliability Of the Tool

Reliability calculated using **Test -Retest** method

- **Section A-** Socio – demographic variable
- **Section B-** Self structured knowledge questionnaire to assess the knowledge regarding electrocardiogram interpretation on cardiac arrhythmias.

r=0.76

Reliability calculated using **split half** method

- **Section A**- Socio – demographic variable
- **Section B-** Self structured knowledge questionnaire to assess the knowledge regarding electrocardiogram interpretation on cardiac arrhythmias.

r^1=0.88

Description Of Intervention (Annexure 5)

Interventional protocol was developed based on books and literature review. The interventional protocol included PowerPoint and information booklet on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias. The lesson plan and content of information booklet and PowerPoint was validated by the experts and modification was done on the basis of suggestions of experts, guide and co-guide and after that PowerPoint and information booklet on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias was finalized. The study participants were collected in teaching rooms / nurses' rooms of respective wards and self-structured knowledge questionnaire was administered for collection of pretest data. The participants required 25 min to complete the knowledge structured questionnaire under the supervision of researcher. The intervention was giving immediately after the collection of pretest data. The researcher collected pretest data from both the groups but the intervention was given only to experimental group immediately after collection of pretest data. The duration of the intervention was 60 min. The intervention was given using lecture cum discussion and PowerPoint slides followed by giving information booklet at the end of intervention. The content of PowerPoint slides and information booklet includes the explanation of electrocardiogram waves , complexes and intervals , determining the rate and rhythms from electrocardiogram , explanation of interpretation of cardiac arrhythmias which includes atrial flutter, atrial fibrillation , multifocal atrial tachycardia, paroxysmal

supraventricular tachycardia , ventricular tachycardia, ventricular fibrillation , torsade de pointes and explanation of interpretation of conduction abnormalities which includes first degree AV block , Mobitz type 1 second degree AV block Wenckebach pattern, Mobitz type II second degree AV block and third degree AV block . After completion of intervention the information booklet was given to the participants. As the sample size was 100, (50 in experimental group) and (50 in control group) it requires 30 days for completion of data collection. Data was collected from 10 nursing officers every day. On 7^{th} day of the intervention, the posttest was administered to the experimental group in the same manner using same knowledge structured questionnaire to assess the effectiveness of intervention under the supervision of the researcher. As the nursing officers who were included in the study was on different shift duties, the investigator approached the staff in all 3 shifts according to the convenience and availability of nursing officers for conducting the post test. The collection of data was completed within a given time. After completion of data collection, the investigator thanked all the study participants for their co-operations.

Ethical Consideration

Ethical clearance was taken from institutional ethical committee **IHEC-SR**

Written permission was obtained from concerned authority (Principal and Medical superintendents)

Informed consent was taken from subjects

Subjects, privacy, anonymity and confidentiality of data was guarded by assigning code.

Procedure Of Data Collection

- Selection of nursing officers using convenient sampling
- Screening using inclusion and exclusion criteria
- Full disclosure regarding study participation and informed consent
- Allocation of nursing officers in experimental and control group
- Pretest data was collected from both the experimental and control group by using self-structured knowledge questionnaire to assess knowledge regarding electrocardiogram interpretation of cardiac arrhythmias.
- Nurse Led Intervention (lecture cum discussion, PowerPoint slides and information booklet) on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias was administered to the experimental group.
- On 7^{th} day of intervention posttest was administered to the experimental group.

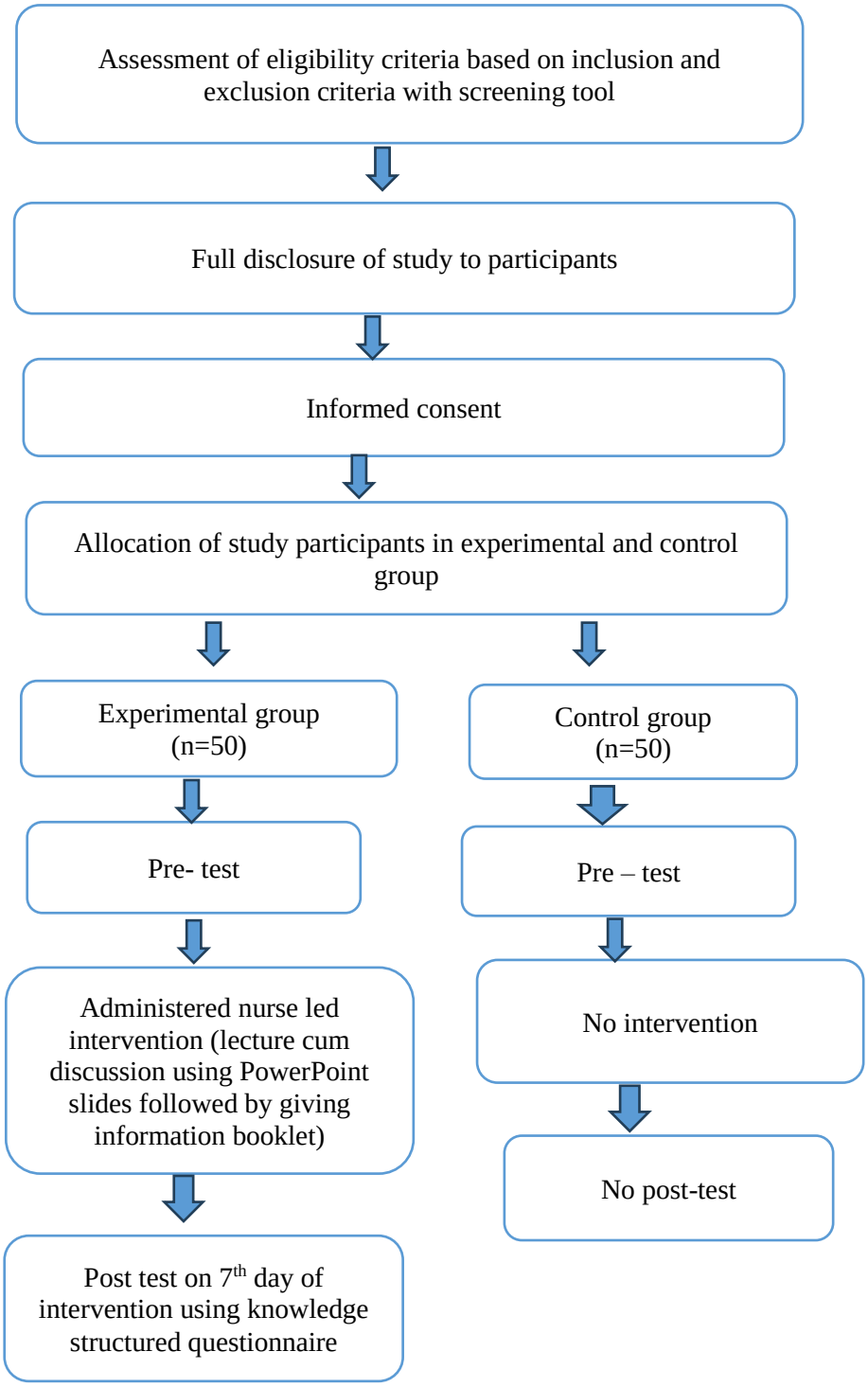
Assessment of eligibility criteria based on inclusion and exclusion criteria with screening tool
Full disclosure of study to participants
Informed consent
Allocation of study participants in experimental and control group
Experimental group (n=50)
Control group (n=50)
Pre- test
Pre – test
Administered nurse led intervention (lecture cum discussion using PowerPoint slides followed by giving information booklet)
No intervention
No post-test
Post test on 7th day of intervention using knowledge structured questionnaire

Figure 3: Flow Diagram of Data Collection Procedure

Pilot Study

Pilot study is a smaller version of a study carried out before the actual investigation is done. Researcher use information gathered in pilot study to refine or modify the research methodology for a study and to develop large scale studies.

Pilot study was conducted among ten nursing officers meeting inclusion criteria to check the effectiveness of criterion measures and to find out feasibility of tool, intervention and methodology.

Average time taken by study subject to complete tool was 25 min. At the end participants were thanked for cooperating with researcher.

The tool was found to be reliable, valid and practicable. The language used in the test items and interventions was found to be appropriate and clear. The tool and intervention were finalized for the main project and arrangement was made for data collection.

Plan For Data Analysis

Data was analyzed using Microsoft excel and IBM's SPSS software version 20 by using descriptive and inferential statistical techniques.

- Descriptive statistics frequency, percentage, mean and standard deviation was used for analysis of socio demographic variables.
- Inferential statistics t -test, Mann -Whitney U test and Wilcoxon Signed rank test was used for analyzing the effectiveness of intervention and to analyze the association of pretest knowledge with selected demographic variable Chi square test was used.

SUMMARY

This chapter deals with description of research approach, research design, research setting population, sample and sampling technique, selection and development of tool, validity of tool, reliability of tool, ethical consideration, pilot study, final data collection procedure and procedure of data analysis**.**

CHAPTER 4

RESULT

Chapter IV

RESULT

Analysis is the process of organizing and synthesizing the data so as to answer the research question and test hypothesis. The purpose of analysis is to reduce the data into and interpretable and meaningful form so that the result can be compared and significance can be identified.

After entering the collected data into MS excel checking and editing of raw data were checked, entire data were checked for missing data and analysis were done using SPSS software.

- Normality of the data was done using Kolmogorov – Smirnov test and data were found normally distributed.
- Homogeneity of data was done using chi -square test and both groups were found homogenous.

Obtained Data Were Categorized as Follows-

Section I- frequency, percentage distribution and homogeneity of sociodemographic variable among nursing officers at AIIMS, Bhopal.

Section II-

i. Frequency, percentage distribution of the pretest knowledge scores regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS, Bhopal.

ii. Mean and standard deviation of pretest knowledge score regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS, Bhopal.

Section III-

Effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS, Bhopal.

i. Frequency, percentage distribution of pretest and posttest knowledge scores among experimental group.

ii. Mean and standard deviation of pretest and posttest knowledge scores among experimental group.

Section IV-

Association between level of pretest knowledge score regarding electrocardiogram interpretation of cardiac arrhythmias with selected socio demographic variables among nursing officers at AIIMS Bhopal.

Section I- Frequency, Percentage Distribution and Homogeneity of Sociodemographic Variable Among Nursing Officers At AIIMS, Bhopal.

Table 3 -Frequency, Percentage Distribution and Homogeneity of Sociodemographic Variable Among Nursing Officers At AIIMS, Bhopal.

N=100

Socio demographic variable		**Experimental group (n=50)**	**Control group (n=50)**	**Chi test**	**df**	**P value**
Age (in years)	**21-25**	23	5	19.584	2	<0.001 **(S)**
	26-30	26	36			
	31-35	1	9			
	>35	0	0			
Gender	**Male**	26	28	0.161	1	0.688 **(NS)**
	female	24	22			
Years of working experience	**<1 year**	5	2	1.668	2	0.434 **(NS)**
	1-5 year	42	46			
	5-10 year	3	2			
	>10 year	0	0			

(df-degree of freedom, n=group size, N=sample size, NS-not significant, S-significant)

Table 3 continued… **N=100**

Socio demographic variable		**Experimental group (n=50)**	**Control group (n=50)**	**Chi test**	**df**	**P value**
Currently working unit	**General /medical ward**	32	0	4.772	2	<0.001 **(S)**
	Surgical ward	0	31			
	Emergency department	0	11			
	Intensive care unit	11	0			
	others	7	8			
Educational level	**General nursing midwifery**	7	9	4.772	2	0.092 **(NS)**
	Post basic certificate	7	15			
	BSc nursing	36	26			
	MSc nursing/M.Phil. /PhD	0	0			
Do you take ECG for patient	**Yes**	**50**	**50**	**N.A.**		
	No	**0**	**0**			

(df-degree of freedom, n=group size, N=sample size, NS-not significant, S-significant)

Table 3 continued… **N=100**

Socio demographic variable		**Experimental group (n=50)**	**Control group (n=50)**	**Chi test**	**df**	**P value**
Have you undergone any ECG interpretation training	**yes**	11	17	1.786	1	0.181 **(NS)**
	No	39	33			
ECG education resources	**courses**	7	8	4.375	2	0.112 **(NS)**
	university	0	0			
	internet	0	4			
	Self-learning books	43	38			
	conference	0	0			

(*df-degree of freedom, n=group size, N=sample size, NS-not significant, S-significant*)

Table 3 depicts Frequency, Percentage Distribution and Homogeneity of Sociodemographic Variable Among Nursing Officers At AIIMS, Bhopal which includes Age, Gender, Years of Experience, Currently Working Unit, Educational Level, Electrocardiogram Interpretation Training, Education Resources. Most of the participant belonged to 26-30 years in both groups (52%) in experimental group and (72%) in control group. Majority of participant were male in both groups 52% in experimental 56% in control group. Majority of the participant had clinical experience between 1-5 years in both groups 84% in experimental group and 92% in control group. Majority of participant in experimental group were working in general wards (64%) and in control group majority of participant were working in (62%) in surgical wards. Majority of participant in both

groups had BSc nursing in both groups, 72% in experimental and 52% in control group. Participants of both groups were found to take ECG in their respective units. Majority of participant in both groups have not undergone any ECG interpretation training 78% in experimental and 66% in control group. Majority of participants of both experimental and control group had undergone ECG education through self – learning books 86% in experimental and 76% in control group.

Experimental and control group were homogenous with respect to all socio demographic variables.

Section II

i. **Frequency, percentage distribution of the pretest knowledge scores regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS, Bhopal.**

Figure 4: Bar graph representing frequency and percentage distribution of Pre – test knowledge score among experimental and control group

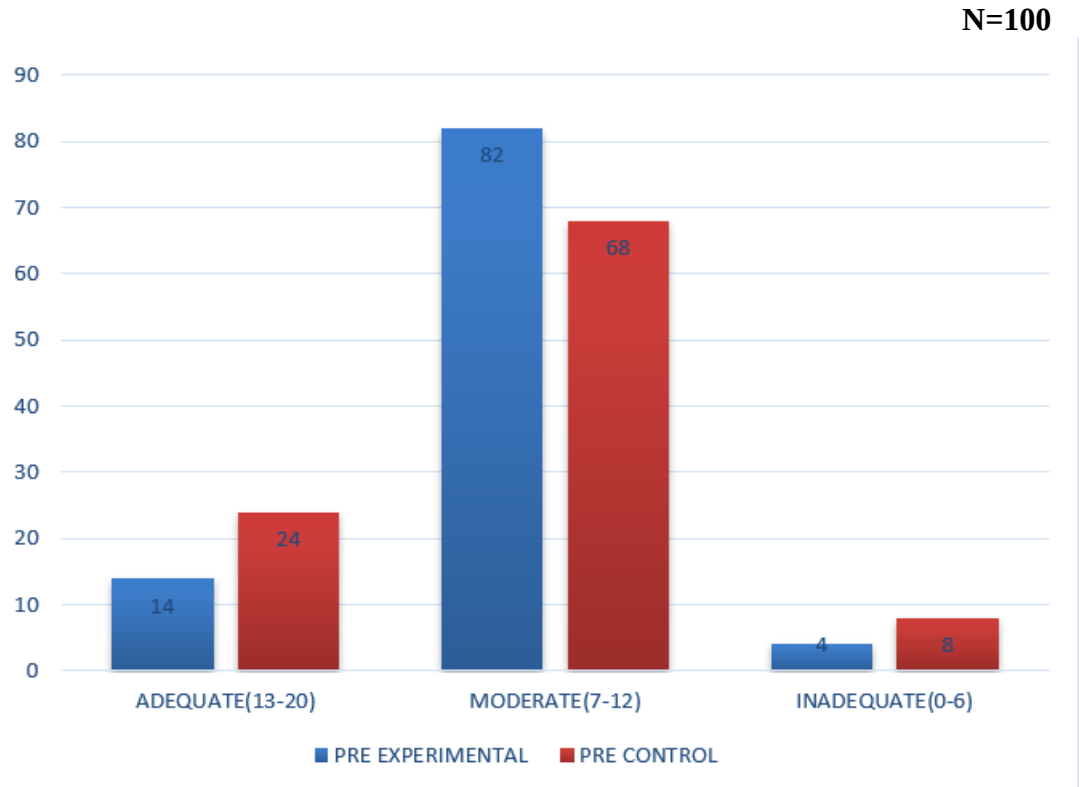

Figure 4 describes the pretest knowledge scores related to electrocardiogram interpretation of cardiac arrhythmias in experimental and control group, majority of the participants, 46(92%) from experimental group and 42(84%) from control group had moderate knowledge whereas participants from 2 (4%) from experimental group 4(8%) from control group had inadequate knowledge and 2(4%) from experimental and 4(8%) from control group had adequate knowledge.

ii. **Mean and standard deviation of pretest knowledge score regarding electrocardiogram interpretation of cardiac arrhythmias among experimental and control group.**

Figure 5: Bar graph representing mean and standard deviation of pretest knowledge score regarding electrocardiogram interpretation of cardiac arrhythmias among experimental and control group.

N=100

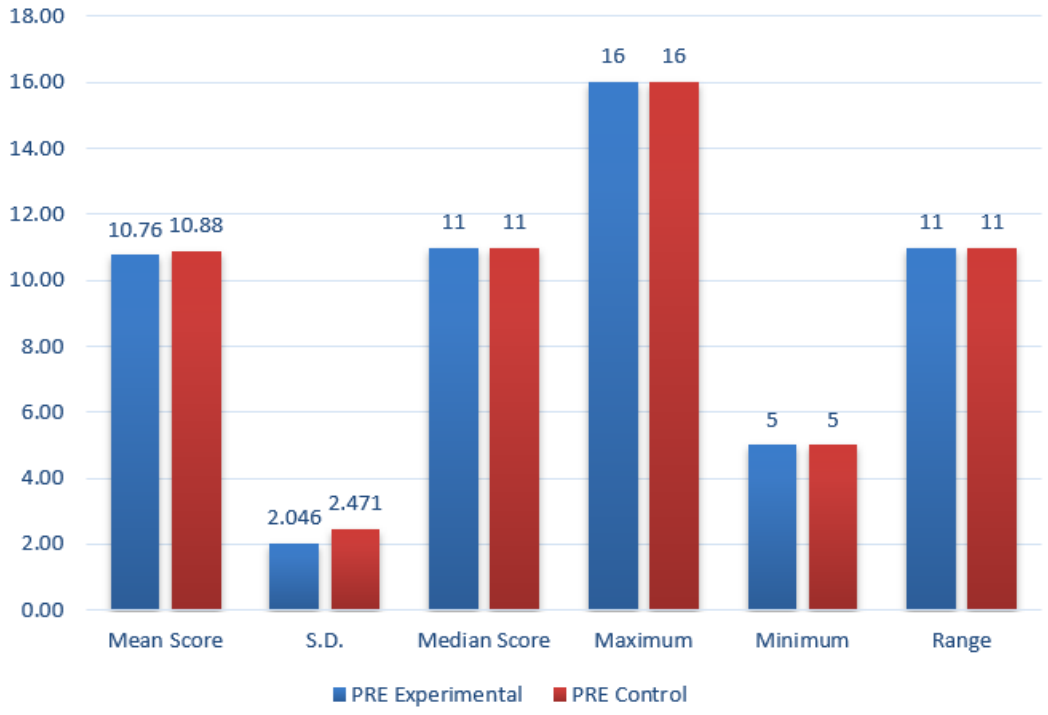

Figure 5 depicts mean and standard deviation of pretest knowledge scores of experimental and control groups it was found that in experimental group the mean score of 10.76 indicates the average level of knowledge, while the standard deviation of 2.046 gives an indication of the variability or dispersion of scores around the mean. The median score of 11 suggests that half of the participants scored below 11 and half scored above. The range (difference between the maximum and minimum scores) is 11, indicating the spread of scores within the dataset. In control group the mean score of 10.88 indicates the average level of knowledge within the group, The median score of 11 suggests that half of the participants scored below 11, and half scored above. The standard deviation of 2.47 gives an indication of the variability or spread of scores around the mean, The maximum score of 16 and minimum score of 5 reflect the range of scores within the dataset, Overall, the group's knowledge scores show a moderate level of understanding, with some variability among individual scores.

Section III-

Effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS, Bhopal.

i. Frequency, percentage distribution of pretest and posttest knowledge scores among experimental group.

Table 4 – Comparison of frequency and percentage distribution of pre -test and posttest knowledge scores among experimental group.

N=100

Experimental group (n=50)	**Inadequate knowledge** **Frequency (%)**	**Moderately adequate knowledge** **Frequency (%)**	**Adequate knowledge** **Frequency (%)**
Pretest	2(4%)	46(92%)	2(4%)
Posttest	0(0%)	1(2%)	49(98%)

Table 4 depicts that in experimental group before intervention 4% of population had inadequate knowledge, 92% had moderate knowledge and 4% had adequate knowledge and after intervention no one had inadequate knowledge, 2% had moderate knowledge and 98% had adequate knowledge.

ii. Mean and standard deviation of pretest and posttest knowledge scores among experimental group.

Table 5 - Mean and standard deviation of pretest and posttest knowledge scores among experimental group.

N=100

Paired T test	**Mean (SD)**	**range**	**Mean diff**	**Paired T test**	**P value**	**Table value at 0.05**
Pretest Knowledge score	10.76±2.046	5-16	6.180	30.685	<0.001 **(Significant**)	2.01
Posttest Knowledge score	16.94±1.046	13-19				

Table 5 draws comparison between pretest and posttest knowledge scores among experimental group using paired T test. The results indicate a significant improvement in knowledge levels from the pretest to the post-test. The paired t-test statistic of 30.685 is much higher than the table value at the 0.05 significance level (2.01), and the p-value is less than 0.001. This suggests a statistically significant difference between the two sets of scores, supporting the conclusion that the post-test knowledge scores are significantly higher than the pretest scores. The mean difference of 6.180 indicates the average increase in knowledge from the pretest to the posttest. Overall, the paired t-test results provide strong evidence of improved knowledge levels after the educational intervention.

Table 4 and Table 5 depicts there was a significant difference between pretest and posttest knowledge scores among experimental group hence N_{01} is rejected.

Section IV-

Association between level of pretest knowledge score regarding electrocardiogram interpretation of cardiac arrhythmias with selected socio demographic variables among nursing officers at AIIMS Bhopal.

Table 6- Association of pretest knowledge score with selected socio demographic variables (experimental group)

N=100

Socio Demographic Variables		**Adequate Knowledge**	**Moderate Knowledge**	**Inadequate Knowledge**	**Chi Test**	**df**	**P value**
Age (in years)	21-25	1	4	0	2.176	4	0.703 **(NS)**
	26-30	3	30	3			
	31-35	0	8	1			
	>35	0	0	0			
Gender	Male	1	23	4	4.729	2	0.094 (**NS)**
	Female	3	19	0			
Years of working experience	<1 year	0	2	0	0.828	4	0.935 **(NS)**
	1-5 year	4	38	4			
	5-10 year	0	2	0			
	>10 years	0	0	0			
Currently working unit	General ward/ medical ward	0	0	0	4.150	4	0.386 **(NS)**
	Surgical wards	4	24	3			
	Emergency department	0	11	0			
	Intensive care unit	0	0	0			
	others	0	7	1			

(*df-degree of freedom, n=group size, N=sample size, NS-not significant, S-significant*)

Table 6 continued… **N=100**

Socio demographic variables		**Adequate knowledge**	**Moderate knowledge**	**Inadequate knowledge**	**Chi test**	**df**	**P value**
Educational level	General nursing and midwifery	0	9	0	2.991	4	0.559 **(NS)**
	Post basic certificate	2	11	2			
	BSc nursing	2	22	2			
	MSc nursing /M. Phil/PhD	0	0	0			
Do you take ECG for patient	Yes	4	42	4	**N.A.**		
	No	0	0	0			
Have you undergone any electrocardiogram interpretation training	Yes	0	15	2	2.572	2	0.276 **(NS)**
	No	4	27	2			
ECG education resources	Courses	1	5	2	4.688	4	0.321 **(NS)**
	University	0	0	0			
	Internet	0	4	0			
	Self-learning book	3	33	2			
	Conference	0	0	0			

***df-degree of freedom, n=group size, N=sample size, NS-not significant, S-significant*)**

Table 6 Shows association between pre-test knowledge scores regarding electrocardiogram interpretation of cardiac arrhythmias with selected demographic variables in experimental group including age, gender , year of working experience , currently working unit , educational level , taking ECG for patient , undergone any electrocardiogram interpretation training and ECG education resources using chi-square test and it was found that there was no significant association between level of pre-test knowledge regarding electrocardiogram interpretation of cardiac arrhythmias with selected demographic variables. The calculate chi – square values were less than the table value at the 0.05 level of significance.

Table 7 Association of pretest knowledge score with selected socio demographic variables (control group). **N=100**

Socio Demographic Variables		Adequate Knowledge	Moderate Knowledge	Inadequate Knowledge	Chi Test	df	P value
Age (in years)	21-25	1	4	0	2.176	4	0.703 **(NS)**
	26-30	3	30	3			
	31-35	0	8	1			
	>35	0	0	0			
Gender	Male	1	23	4	4.729	2	0.094 **(NS)**
	Female	3	19	0			
Years of working experience	<1 year	0	2	0	0.828	4	0.935 **(NS)**
	1-5 year	4	38	4			
	5-10 year	0	2	0			
	>10 years	0	0	0			
Currently working unit	General ward/ medical ward	0	0	0	4.150	4	0.386 **(NS)**
	Surgical wards	4	24	3			
	Emergency department	0	11	0			
	Intensive care unit	0	0	0			
	others	0	7	1			

(df-degree of freedom, n=group size, N=sample size, NS-not significant, S-significant)

Table 7 continued… **N=100**

Socio demographic variable		**Adequate knowledge**	**Moderate knowledge**	**Inadequate knowledge**	**Chi - test**	**df**	**P value**
Educational level	General nursing and midwifery	0	9	0	2.991	4	0.559 **(NS)**
	Post basic certificate	2	11	2			
	BSc nursing	2	22	2			
	MSc nursing /M. Phil/PhD	0	0	0			
Do you take ECG for patient	Yes	4	42	4	**N.A.**		
	No	0	0	0			
Have you undergone any electrocardiogram interpretation training	Yes	0	15	2	2.572	2	0.276 **(NS)**
	No	4	27	2			
ECG education resources	Courses	1	5	2	4.688	4	0.321 **(NS)**
	University	0	0	0			
	Internet	0	4	0			
	Self-learning book	3	33	2			
	Conference	0	0	0			

(df-degree of freedom, n=group size, N=sample size, NS-not significant, S-significant)

Table 7 Shows association between pre-test knowledge scores regarding electrocardiogram interpretation of cardiac arrhythmias with selected demographic variables in control group including age, gender , year of working experience , currently working unit , educational level , taking ECG for patient , undergone any electrocardiogram interpretation training and ECG education resources using chi-square test and it was found that there was no significant association between level of pre-test knowledge regarding electrocardiogram interpretation of cardiac arrhythmias with selected demographic variables. The calculate chi – square values were less than the table value at the 0.05 level of significance.

SUMMARY

This chapter deals with the analysis and interpretation of data collected, analysis and interpretation were done in accordance with the objective laid down for the study. The data collected through tool was coded and organized in Microsoft Excel. The data was then analyzed using IBM SPS software for descriptive and inferential methods, including frequency percentage mean, standard division, chi square and paired Test.

CHAPTER 5
DISCUSSION

CHAPTER V

DISCUSSION

To explore further about effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers, certain recommendations are made by researcher and implication of this research's finding in various fields of nursing also presented in chapter.

Major Findings Of The Study Related To The Study Participant

- Most of the participant belonged to 26-30 years in both groups (52%) in experimental group and (72%) in control group.
- Majority of participant were male in both groups 52% in experimental 56% in control group.
- Majority of the participant had clinical experience between 1-5 years in both groups 84% in experimental group and 92% in control group
- Majority of participant in experimental group were working in general wards (64%) and in control group majority of participant were working in (62%) in surgical wards.
- Majority of participant in both groups had BSc nursing in both groups, 72% in experimental and 52% in control group.
- Participants of both groups were found to take ECG in their respective units.
- Majority of participant in both groups have not undergone any ECG interpretation training 78% in experimental and 66% in control group.
- Majority of participants of both experimental and control group had undergone ECG education through self – learning books 86% in experimental and 76% in control group.

Findings Of The Study Related To Intervention

Knowledge regarding electrocardiogram interpretation of cardiac arrhythmias before intervention.

Majority of study participant had moderately pre – test knowledge regarding electrocardiogram interpretation of cardiac arrhythmias 82% in experimental group and 68% in control group.

Statistical analysis showed no significant difference (p=0.7920) between pretest knowledge in experimental and control group with mean pre – test knowledge in experimental group found to be 10.76(SD=2.05) and 10.88(SD=2.47) in control group of maximum score of 20.

Effectiveness of intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias

Mean post-test knowledge score of experimental groups after intervention was reported to be 16.94 (SD= 1.046).

In experimental group, statistical analysis exhibited a significant difference ($p<0.001$) in knowledge before and after intervention.

Findings Of The Study Related To Association

There was no significant association reported between pretest knowledge and socio demographic variables. The calculated chi – square value was less than the table value at the 0.05 level of significance.

DISSCUSSION

Description of the pretest level of knowledge related to electrocardiogram interpretation of cardiac arrhythmias in experimental and control group.

In present study majority of the participants, 46(92%) from experimental group and 42(84%) from control group had moderate knowledge whereas participants from 2 (4%) from experimental group 4(8%) from control group had inadequate knowledge and 2(4%) from experimental and 4(8%) from control group had adequate knowledge.

Similar study conducted by **Jacob J et al.** in year (**2018)** among 100 staff nurses show that 64% staff nurses had average pretest level of knowledge regarding electrocardiogram interpretation of cardiac arrhythmias and its management. [(16)]

Whereas the study conducted by **Sakhardande DVD in year (2018)** among the staff nurses working in critical care unit and it was found that 93.3% of staff nurses had average pretest level of knowledge regarding electrocardiogram interpretation of cardiac arrhythmias, 6.67 % had poor knowledge and no one had excellent pretest level of knowledge regarding electrocardiogram interpretation of cardiac arrhythmias. [(14)]

Effectiveness of intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias.

In present study Mean post-test knowledge score of experimental groups after intervention was reported to be 16.94 (SD= 1.046), and statistical analysis exhibited that there was a significant difference ($p<0.001$) in knowledge score before and after intervention.

Similar study conducted by **Jacob J et al in year (2018**) revealed that the computed value of "t" was greater than the tabulated value of "t," indicating a significant increase in mean knowledge score following the intervention program, according to the paired t test. at 0.05 level of significance. [(16)]

Similar study conducted by **Umar NS in year (2021)** show the effectiveness of intervention as there was a significant difference between level of knowledge score before and after intervention at 0.05 level of significance. [1]

whereas, a number of studies conducted by **Omidifar N, Yamani N, Yousefi A , Lak K, Zareie F, Habibzadeh H, Mohammadpour Y, at el. And Najafi S, Haghgou M, Kaveh M, et al.** have found that, when compared to other educational method, lecture method has little educational impact in increasing knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nurses. [(32)(33)(34)]

Description of association of pretest knowledge score with selected socio demographic variables.

In present study there was no significant association reported between pretest knowledge and socio demographic variables. The calculated chi – square value was less than the table value at the 0.05 level of significance.

Similar study conducted by **Umar NS in year (2021)** and **Jacob J et al in year (2018)** shows that there was no significant association reported between pretest knowledge and socio demographic variables. The calculated chi – square value was less than the table value at the 0.05 level of significance. [1,16]

Similar study conducted **Philip NG, Chauhan K in year (2020)** reveals that there was a significant association between demographic variable, nurses' exposure to the training program, with their knowledge regarding interpretation of cardiac arrhythmias and its management but there was no significant association between knowledge and other demographic variables such as age, gender, qualification, department of experience and years of experience of the nurses. [4]

LIMITATIONS

- since the design was quasi experimental non-equivalent control group design there was increased risk of selection bias to lack of random assignments in both experimental and control group.
- Since there was no posttest for control group as per **IHEC-SR** recommendation due to which it lacks the ability to demonstrate a causal relationship because there is no comparison group to isolate the effects of the intervention from other potential influences.

IMPLICATIONS

NURSING PRACTICE

- Nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias found to effective which can be put into enhance the knowledge regarding interpretation of electrocardiogram and to manage the life-threatening conditions.
- Better understanding of the fundamentals and advanced techniques of electrocardiogram interpretation of cardiac arrhythmias might prevent many cardiac events from becoming more serious or persistent, which would otherwise rank among the leading causes of mortality globally. [14]
- Evidence based practice can be done.

NURSING ADMINISTRATION

Health administration plays a pivotal role in supervision and management of nursing profession.

- Nurse administrator should take the initiative in organizing continuing education programs for nurses regarding various aspects of interpretation of electrocardiogram.

- Appropriate teaching/ learning material needs to be prepared and made available for nurses,

NURSING RESEARCH

- The finding of the present study can be utilized by nurse investigators to contribute to the profession to accumulate new knowledge regarding interpretation of electrocardiogram and can make professional accountability to educate and motivate the staff nurses.
- The study may be a valuable reference material for future researches.
- Future follow-up studies may be conducted according to recommendation from present study.

RECOMMENDATIONS

- Similar study can be conducted using a randomized control trial study design.
- Similar study using practical skills assessment checklist can be conducted.
- Different mode of teaching can be used.

CONCLUSION

Nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias found to be effective in increasing knowledge of electrocardiogram interpretation of cardiac arrhythmias among nursing officers. It can be a part of targeted intervention as intention focused, cost effective training. By expanding this intervention health care professionals can manage various life-threatening cardiac conditions.

SUMMARY

This chapter includes major study findings, discussion with reference studies, limitations, implications and conclusion of the study.

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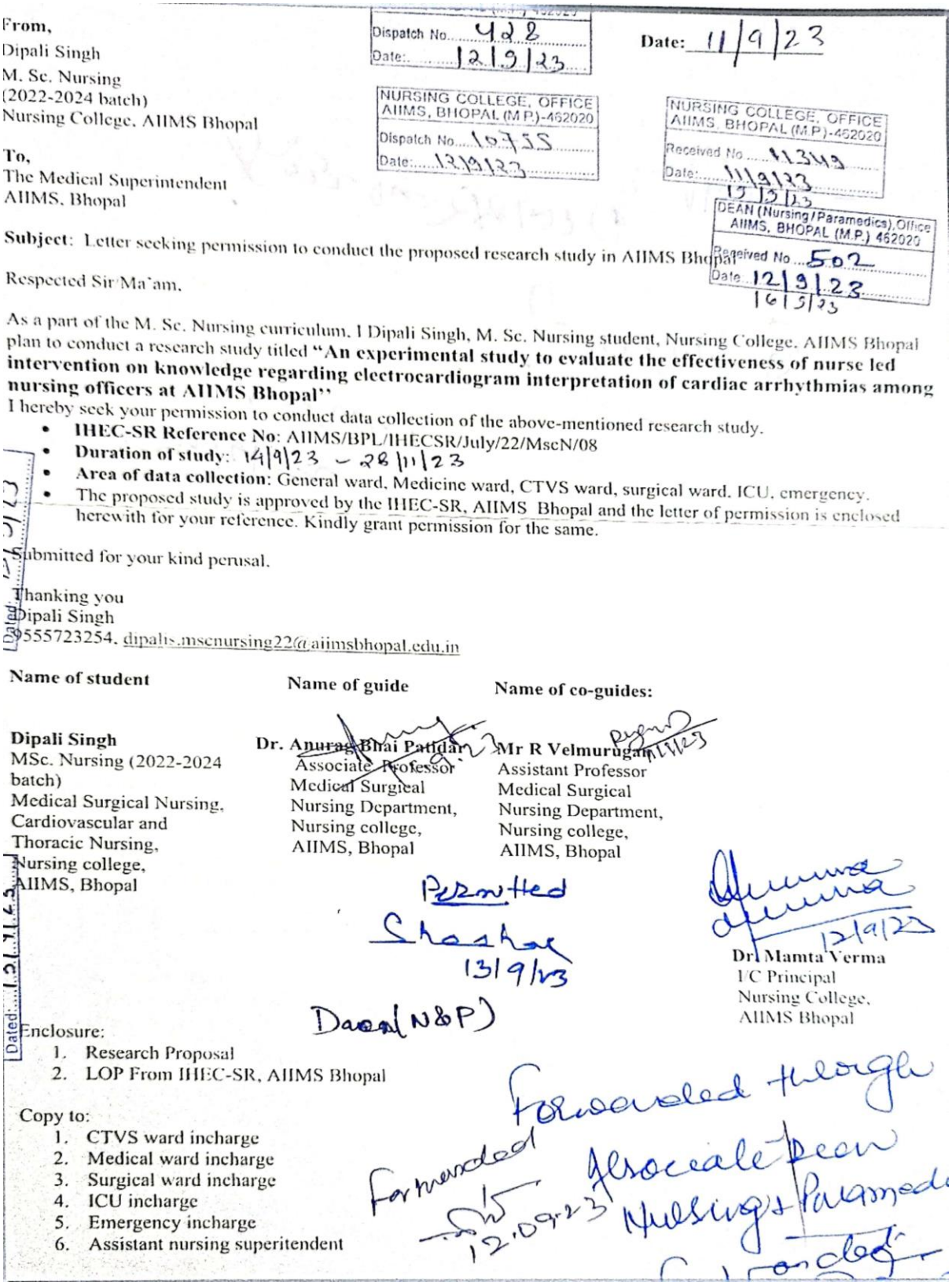
ANNEXURES

ANNEXURE 1

LETTER SEEKING PERMISSION FOR CONDUCTING STUDY



From,
Dipali Singh
M. Sc. Nursing
(2022-2024 batch)
Nursing College, AIIMS Bhopal

Dispatch No. 428
Date: 12/9/23

Date: 11/9/23

NURSING COLLEGE, OFFICE
AIIMS, BHOPAL (M.P.)-462020
Dispatch No. 1975
Date: 13/9/23

NURSING COLLEGE, OFFICE
AIIMS, BHOPAL (M.P.)-462020
Received No. 11343
Date: 11/9/23
12/9/23

DEAN (Nursing/Paramedics), Office
AIIMS, BHOPAL (M.P.) 462020
Received No. 502
Date 12/9/23
16/9/23

To,
The Medical Superintendent
AIIMS, Bhopal

Subject: Letter seeking permission to conduct the proposed research study in AIIMS Bhopal

Respected Sir/Ma'am,

As a part of the M. Sc. Nursing curriculum, I Dipali Singh, M. Sc. Nursing student, Nursing College, AIIMS Bhopal plan to conduct a research study titled **"An experimental study to evaluate the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS Bhopal"**

I hereby seek your permission to conduct data collection of the above-mentioned research study.

- **IHEC-SR Reference No**: AIIMS/BPL/IHECSR/July/22/MscN/08
- **Duration of study**: 14/9/23 – 28/11/23
- **Area of data collection**: General ward, Medicine ward, CTVS ward, surgical ward, ICU, emergency.
- The proposed study is approved by the IHEC-SR, AIIMS Bhopal and the letter of permission is enclosed herewith for your reference. Kindly grant permission for the same.

Submitted for your kind perusal.

Thanking you
Dipali Singh
9555723254, dipalis.mscnursing22@aiimsbhopal.edu.in

Dated: 11/9/23

Name of student	Name of guide	Name of co-guides:
Dipali Singh MSc. Nursing (2022-2024 batch) Medical Surgical Nursing, Cardiovascular and Thoracic Nursing, Nursing college, AIIMS, Bhopal	**Dr. Anurag Bhai Patidar** Associate Professor Medical Surgical Nursing Department, Nursing college, AIIMS, Bhopal	**Mr R Velmurugan** Assistant Professor Medical Surgical Nursing Department, Nursing college, AIIMS, Bhopal

Dated: 12.9.23

Permitted
Shashaq
13/9/23

Dr. Mamta Verma
I/C Principal
Nursing College,
AIIMS Bhopal
12/9/23

Dean (N&P)

Enclosure:
1. Research Proposal
2. LOP From IHEC-SR, AIIMS Bhopal

Copy to:
1. CTVS ward incharge
2. Medical ward incharge
3. Surgical ward incharge
4. ICU incharge
5. Emergency incharge
6. Assistant nursing superintendent

Forwarded through
Associate Dean
Nursing/Paramedics
Forwarded
12.09.23

Annexure 2

Sample Size

Sample Size For Comparing Two Means

Input Data

Confidence Interval (2-sided)	95%
Power	80%
Ratio of sample size (Group 2/Group 1)	1

	Group 1	Group 2	Difference*
Mean	27.3	24.54	2.76
Standard deviation	4.26	3.96	
Variance	18.1476	15.6816	

Sample size of Group 1	35
Sample size of Group 2	35
Total sample size	70

*Difference between the means

Results from OpenEpi, Version 3, open source calculator--SSMean
Print from the browser with ctrl-P
or select text to copy and paste to other programs.

ANNEXURE 3

DATA COLLECTION TOOL(English)

Section-A – Socio demographic questionnaire

Instructions: kindly tick and fill in the blanks the most appropriate answer for each time. The information provided by you will be kept confidential and only be used for research purpose.

1. Age (in years)
    - 21-25 years
    - 26-30 years
    - 31-35 years
    - >35 years
2. Gender
    - Male
    - Female

3.years of working experience as registered nurse
    - <1 years
    - 1-5 years
    - 6-10 years
    - >10 years

4.Currently working unit in hospital
    - General ward/Medical ward
    - Surgical wards
    - Emergency department
    - Intensive care unit
    - others

5.Educational level
    - General nursing and midwifery
    - Post basic certificate
    - BSc nursing
    - MSc nursing /M. Phil/PhD

6. Do you take ECG for patient
    - Yes
    - No

7. Have you undergone any ECG interpretation training
    - Yes
    - No

8.ECG education resources

- Courses
- University
- Internet
- Self -learning books
- Conference

Section B -Structured questionnaire to assess the knowledge on electrocardiogram interpretation on cardiac arrhythmia among nursing offices at AIIMS Bhopal.

1- Who discovered ECG-
   a) Hans Berger
   b) Willem Einthoven
   c) Paul Ehrlich
   d) Hippocrates

2- The P wave on the electrocardiogram corresponds to
   a) Atrial depolarization
   b) Atrial repolarization
   c) Ventricular depolarization
   d) Ventricular repolarization

3- Normal duration of P wave is-
   a) Less than 0.12 sec
   b) More than 0.12 sec
   c) Equal to 0.12 sec
   d) Between 0.12 -0.20 sec

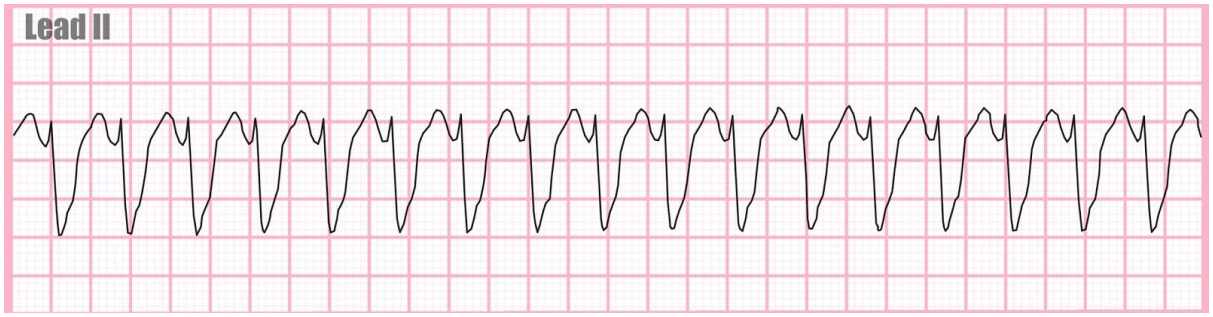
4- P wave on the electrocardiogram is seen due to
   a) Ventricular contraction
   b) Atrial contraction
   c) Ventricular relaxation
   d) Atrial relaxation

5- The QRS complex on the electrocardiogram corresponds to
   a) Atrial depolarization
   b) Atrial repolarization
   c) Ventricular depolarization
   d) Ventricular repolarization

6- The QRS complex on the electrocardiogram is seen due to-
   a) Ventricular contraction
   b) Atrial contraction
   c) Ventricular relaxation
   d) Atrial relaxation

7- Normal duration of PR interval is-
   a) Less than 0.12 sec
   b) More than 0.12 sec
   c) Equal to 0.12 sec
   d) Between 0.12 -0.20 sec

8-Identify the ECG strip-

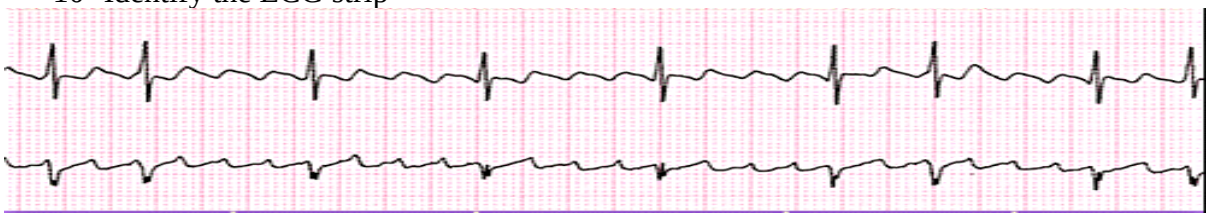


a) Ventricular tachycardia
b) Ventricular fibrillation
c) Atrial tachycardia
d) Atrial fibrillation

9-Which of the following indicate paroxysmal supraventricular tachycardia-

a) Narrow QRS with regular RR
b) Broad QRS with regular RR
c) Narrow QRS with irregular RR
d) Broad QRS with irregular RR

10- Identify the ECG strip-



a) Ventricular tachycardia
b) Ventricular fibrillation
c) Atrial Flutter
d) Atrial fibrillation

11-Which of the following indicate multifocal atrial tachycardia

a) Narrow ORS with regular RR
b) Narrow QRS complex with irregular RR with more than three p waves
c) Broad QRS with regular RR
d) Narrow QRS complex with irregular RR with absent p waves

12-Which of the following indicate atrial fibrillation

a) Narrow ORS with regular RR
b) Narrow QRS complex with irregular RR with more than three p waves
c) Broad QRS with regular RR
d) Narrow QRS complex with irregular RR with absent P waves

13-Identify the ECG strip-

a) Multifocal atrial tachycardia
b) Atrial fibrillation
c) ventricular fibrillation
d) Ventricular tachycardia

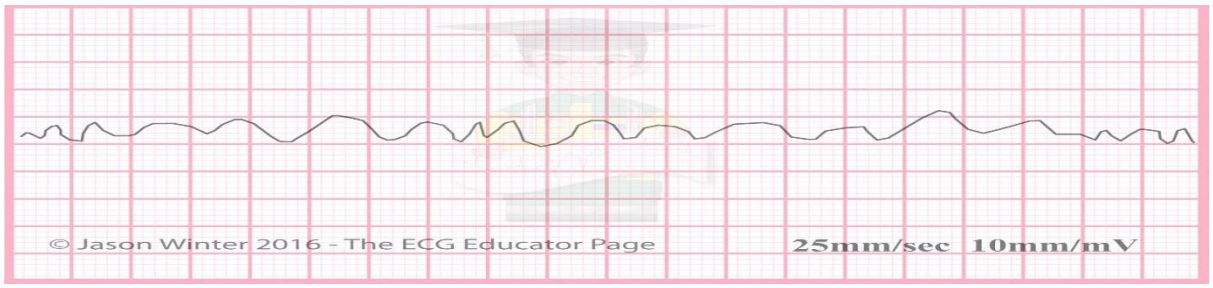
14-which of the following indicate ventricular fibrillation-

a) Broad QRS, irregular RR, more than 3 three QRS
b) Narrow QRS complex with irregular RR with more than three p waves
c) Broad QRS complex, irregular RR, unidentified QRS
d) Broad QRS with regular RR

15. Which of the following indicate Torsadus De Pointeus / polymorphic ventricular tachycardia-

a) Broad QRS, irregular RR, more than 3 three QRS
b) Narrow QRS complex with irregular RR with more than three p waves
c) Broad QRS complex, irregular RR, unidentified QRS
d) Broad QRS with regular RR

16.Identify the ECG strip-



a) Ventricular tachycardia
b) Ventricular fibrillation
c) Atrial tachycardia
d) Atrial fibrillation

17. Which of the following indicate first degree AV block

a) Prolonged PR interval without missed beats
b) Prolonged PR interval with missed beats

c) AV dissociation
d) None of the above

18. Which of the following indicate Mobitz I heart block

a) Varying PR interval with drop beats
b) Constant PR interval with drop beats
c) Constant PP interval and constant RR interval
d) All of the above

19. Which of the following indicate Mobitz II heart block

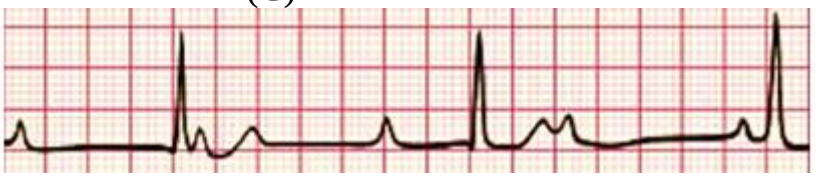
a) Varying PR interval with drop beats
b) Constant PR interval with drop beats
c) Constant PP interval and constant RR interval
d) All of the above

20. Identify the ECG strip-

(A)

(B)

(C)



(D)

a) First degree AV block, Mobitz I, Mobitz II, third degree AV block
b) Mobitz I, Mobitz II, third degree AV block, first degree AV block
c) Mobitz II, Mobitz I , first degree AV block , third degree AV block
d) Third degree AV block, Mobitz I , Mobitz II, first degree AV block

ANNEXURE 4

DATA COLLECTION TOOL(Hindi)

डेटा संग्रह के लिए उपकरण

अनुभाग-ए - सामाजिक जनसांख्यिकीय चर

निर्देश: कृपया प्रत्येक बार के लिए सबसे उपयुक्त उत्तर पर निशान लगाएं और रिक्त स्थान भरें। आपके द्वारा प्रदान की गई जानकारी गोपनीय रखी जाएगी और केवल शोध उद्देश्य के लिए उपयोग की जाएगी।

1. आयु (वर्षों में)

2. लिंग

a) पुरुष

b) महिला

पंजीकृत नर्स के रूप में 3 वर्ष का कार्य अनुभव

a) <1 वर्ष

b) 1-5 वर्ष

c) 6-10 वर्ष

d) >10 वर्ष

4.वर्तमान में अस्पताल में कार्यरत इकाई

a) सामान्य वार्ड/मेडिकल वार्ड

b) सर्जिकल वार्ड

c) आपातकालीन विभाग

d) गहन देखभाल इकाई

e) अन्य

5. शैक्षणिक स्तर

a) सामान्य नर्सिंग और दाई का काम

b) मूल प्रमाणपत्र पोस्ट करें

c) बीएससी नर्सिंग

d) एमएससी नर्सिंग/एम. फिल/पीएचडी

6. क्या आप मरीज के लिए ईसीजी लेते हैं?

a) हाँ

b) नहीं

7. क्या आपने कोई ईसीजी व्याख्या प्रशिक्षण लिया है

a) हाँ

b) नहीं

8.ईसीजी शिक्षा संसाधन

• पाठ्यक्रम

a) विश्वविद्यालय
b) इंटरनेट
c) स्व-सीखने वाली पुस्तकें
d) सम्मेलन

अनुभाग बी - एम्स भोपाल में नर्सिंग कार्यालयों के बीच कार्डियक अतालता पर इलेक्ट्रोकार्डियोग्राम व्याख्या पर ज्ञान का आकलन करने के लिए संरचित प्रश्नावली।

1- ईसीजी की खोज किसने की-

a) हंस बर्जर
b) विलेम एंथोवेन
c) पॉल एर्लिच
d) हिप्पोक्रेट्स

2- इलेक्ट्रोकार्डियोग्राम पर पी तरंग मेल खाती है

a) आलिंद विध्रुवण
b) अलिंद पुनर्ध्रुवीकरण
c) वेंट्रिकुलर विध्रुवण
d) वेंट्रिकुलर रिपोलराइजेशन

3- P तरंग की सामान्य अवधि है-

a) 0.12 सेकंड से कम
a) 0.12 सेकंड से अधिक
b) 0.12 सेकंड के बराबर
c) 0.12 -0.20 सेकंड के बीच

4- इलेक्ट्रोकार्डियोग्राम पर P तरंग किसके कारण दिखाई देती है?

a) वेंट्रिकुलर संकुचन
b) आलिंद संकुचन
c) वेंट्रिकुलर विश्राम
d) आलिंद विश्राम

5- इलेक्ट्रोकार्डियोग्राम पर क्यूआरएस कॉम्प्लेक्स से मेल खाता है

a) आलिंद विध्रुवण

b) अलिंद पुनर्ध्रुवीकरण

c) वेंट्रिकुलर विध्रुवण

d) वेंट्रिकुलर रिपोलराइजेशन

6- इलेक्ट्रोकार्डियोग्राम पर QRS कॉम्प्लेक्स किसके कारण दिखाई देता है?

a) वेंट्रिकुलर संकुचन

b) आलिंद संकुचन

c) वेंट्रिकुलर विश्राम

d) आलिंद विश्राम

7- पीआर अंतराल की सामान्य अवधि है-

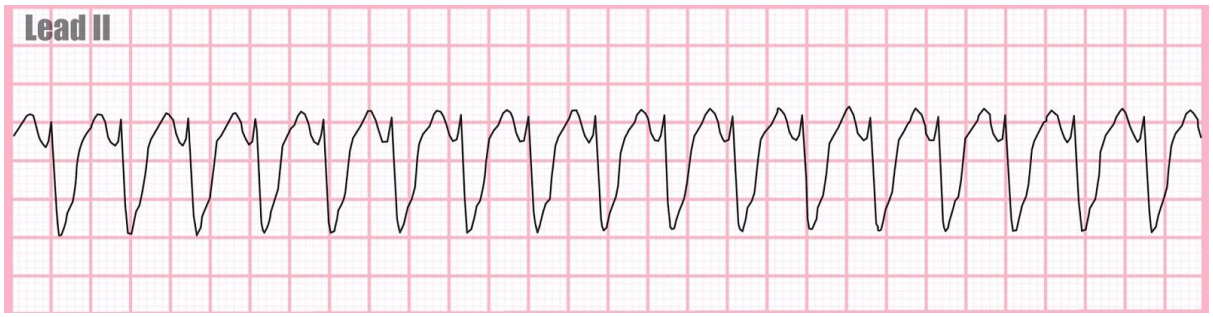
a) 0.12 सेकंड से कम

a) 0.12 सेकंड से अधिक

b) 0.12 सेकंड के बराबर

c) 0.12 -0.20 सेकंड के बीच

8) ईसीजी स्ट्रिप को पहचानें



a) वेंट्रिकुलर टैचीकार्डिया

b) वेंट्रिकुलर फाइब्रिलेशन

c) अलिंद क्षिप्रहृदयता

d) आलिंद फिब्रिलेशन

9)निम्नलिखित में से कौन पैरॉक्सिस्मल सुप्रावेंट्रिकुलर टैचीकार्डिया को इंगित करता है-

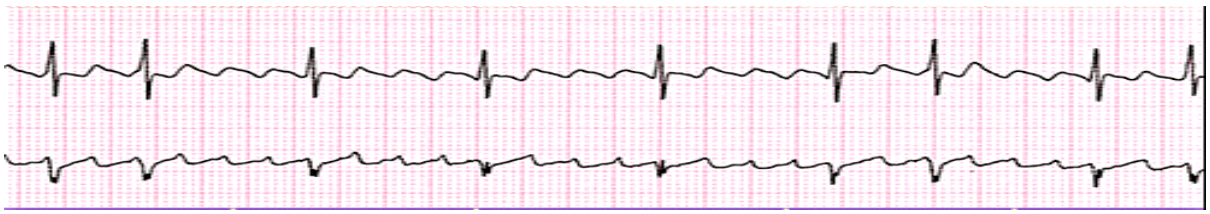
a) नियमित आरआर के साथ संकीर्ण क्यूआरएस

b) नियमित आरआर के साथ व्यापक क्यूआरएस

c) अनियमित आरआर के साथ संकीर्ण क्यूआरएस

d) अनियमित आरआर के साथ व्यापक क्यूआरएस

10- ईसीजी स्ट्रिप को पहचानें-



a) वेंट्रीकुलर टेचिकार्डिया
b) वेंट्रिकुलर फाइब्रिलेशन
c) आलिंद स्पंदन
d) आलिंद फिब्रिलेशन

11-निम्नलिखित में से कौन मल्टीफोकल एट्रियल टैचीकार्डिया को इंगित करता है

a) नियमित आरआर के साथ संकीर्ण ओआरएस
b) तीन पी से अधिक तरंगों के साथ अनियमित आरआर के साथ संकीर्ण क्यूआरएस कॉम्प्लेक्स
c) नियमित आरआर के साथ व्यापक क्यूआरएस
d) अनुपस्थित पी तरंगों के साथ अनियमित आरआर के साथ संकीर्ण क्यूआरएस कॉम्प्लेक्स

12-निम्नलिखित में से कौन सा आलिंद फिब्रिलेशन का संकेत देता है

a) नियमित आरआर के साथ संकीर्ण ओआरएस
b) तीन पी से अधिक तरंगों के साथ अनियमित आरआर के साथ संकीर्ण क्यूआरएस कॉम्प्लेक्स
c) नियमित आरआर के साथ व्यापक क्यूआरएस
d) अनुपस्थित पी तरंगों के साथ अनियमित आरआर के साथ संकीर्ण क्यूआरएस कॉम्प्लेक्स

13. ईसीजी स्ट्रिप को पहचानें-

a) मल्टीफोकल एट्रियल टैचीकार्डिया
b) आलिंद फिब्रिलेशन
c) वेंट्रिकुलर फाइब्रिलेशन
d) वेंट्रिकुलर टैचीकार्डिया

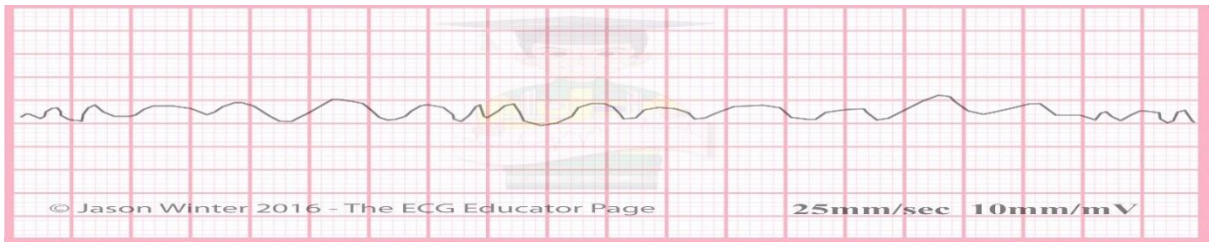
14. निम्नलिखित में से कौन वेंट्रिकुलर फाइब्रिलेशन को इंगित करता है-

a) व्यापक क्यूआरएस, अनियमित आरआर, 3 से अधिक तीन क्यूआरएस
b) तीन पी से अधिक तरंगों के साथ अनियमित आरआर के साथ संकीर्ण क्यूआरएस कॉम्प्लेक्स
c) व्यापक क्यूआरएस कॉम्प्लेक्स, अनियमित आरआर, अज्ञात क्यूआरएस
d) नियमित आरआर के साथ व्यापक क्यूआरएस

15. निम्नलिखित में से कौन टॉर्सेडस डी पॉइंटियस/पॉलीमॉर्फिक वेंट्रिकुलर टैचीकार्डिया को इंगित करता है-

a) व्यापक क्यूआरएस, अनियमित आरआर, 3 से अधिक तीन क्यूआरएस
b) तीन पी से अधिक तरंगों के साथ अनियमित आरआर के साथ संकीर्ण क्यूआरएस कॉम्प्लेक्स
c) व्यापक क्यूआरएस कॉम्प्लेक्स, अनियमित आरआर, अज्ञात क्यूआरएस
d) नियमित आरआर के साथ व्यापक क्यूआरएस

16. ईसीजी स्ट्रिप को पहचानें-



a) वेंट्रिकुलर टैचीकार्डिया
b) वेंट्रिकुलर फाइब्रिलेशन
c) अलिंद क्षिप्रहृदयता
d) आलिंद फिब्रिलेशन

17. निम्नलिखित में से कौन प्रथम डिग्री एवी ब्लॉक को दर्शाता है

a) मिस्ड बीट्स के बिना लंबे समय तक पीआर अंतराल
b) मिस्ड बीट्स के साथ लंबे समय तक पीआर अंतराल
c) एवी पृथक्करण
d) उपरोक्त में से कोई नहीं

18. निम्नलिखित में से कौन सा मोबिट्ज़ । को दर्शाता है

a) ड्रॉप बीट्स के साथ बदलता पीआर अंतराल
b) ड्रॉप बीट्स के साथ लगातार पीआर अंतराल
c) लगातार पीपी अंतराल और लगातार आरआर अंतराल
d) उपरोक्त सभी

19. निम्नलिखित में से कौन मोबिट्ज़ II को इंगित करता है

a) ड्रॉप बीट्स के साथ बदलता पीआर अंतराल
b) ड्रॉप बीट्स के साथ लगातार पीआर अंतराल
c) लगातार पीपी अंतराल और लगातार आरआर अंतराल
d) उपरोक्त सभी

20. ईसीजी स्ट्रिप को पहचानें-

a) प्रथम डिग्री एवी ब्लॉक, मोबिट्ज़ I, मोबिट्ज़ II, तीसरी डिग्री एवी ब्लॉक
b) मोबिट्ज़ I, मोबिट्ज़ II, तीसरी डिग्री एवी ब्लॉक, पहली डिग्री एवी ब्लॉक
c) मोबिट्ज़ II, मोबिट्ज़ I, पहली डिग्री एवी ब्लॉक, तीसरी डिग्री एवी ब्लॉक
d) तीसरी डिग्री एवी ब्लॉक, मोबिट्ज़ I, मोबिट्ज़ II, पहली डिग्री एवी ब्लॉक

Annexure 5

Intervention protocol

Lesson Plan for Electrocardiogram Interpretation of Cardiac Arrhythmias

Topic: Electrocardiogram interpretation of cardiac arrhythmias

Group: nursing officers at AIIMS Bhopal

Place: AIIMS Bhopal

Duration: 60 min

Type of teaching: Group

Teaching method: Lecture cum discussion

Instructor: Investigator

Instrumental Aid: Power point presentation

General Objective: At the end of the intervention the nursing officers develops in depth knowledge regarding electrocardiogram interpretation on cardiac arrhythmias

Specific objectives: At the end of the intervention the nursing officers will be able to:

1. Introduces the electrocardiogram
2. To explain ECG waves and components
3. To explain waves, complexes and intervals
4. To describe the methods to determine heart rate from the electrocardiogram
5. To explain the electrocardiogram interpretation of cardiac arrhythmias and conduction abnormalities.
6. To explain the electrocardiogram interpretation of conduction abnormalities

Time	Specific objectives	Content	Investigator and learner activity	AV AIDS	Evaluation
3 min	1. To Introduce the electrocardiogram	**Introduction** **Founder of ECG - WIILIAM EITHOVEN** The electrical impulse that travels through the heart can be viewed by means of electrocardiography, the end product of which is an electrocardiogram, or ECG. Each phase of the cardiac cycle is reflected by specific waveforms on the screen of a cardiac monitor or on a strip of ECG graph paper.	Lecture cum Discussion	PowerPoint presentation, and information booklet	Introduce the electrocardiogram
5 min	2. To explain ECG waves and components	**ECG WAVES AND COMPONENTS** ➢ The ECG waveforms reflects the function of the hearts conduction system, which normally initiates and conducts the electrical activity in relation to the lead. ➢ The ECG offers important, information about the electrical activity of the heart and is useful	Lecture cum Discussion	PowerPoint presentation, and information booklet	Explain ECG waves and components

		in diagnosing the dysrhythmias. ➢ ECG waveforms are printed on graph paper that is divided by light and dark vertical and horizontal lines at standard intervals. ➢ Time and rate are measured on the horizontal axis of the graph and amplitude or voltage is measured on the vertical axis. ➢ When ECG waveforms move towards the top of the paper, it is called positive deflection. When it is moved towards the bottom of the paper, it is called negative deflection.			
4 min	3. To explain waves, complexes and intervals	**Waves, Complexes and Intervals** The ECG is composed of waveforms, including the **P wave,** the **QRS**	Lecture cum Discussion	PowerPoint presentation, and information booklet	Explain waves, complexes and intervals

		complex, the **T wave** and possibly a **U wave**, and of segments and intervals, including the **PR interval**, **ST segment** and **QT interval.** **P wave** ➢ First positive wave ➢ P waves occurs due to atrial contraction ➢ Represents atrial depolarization ➢ Height -2.5 mm or less ➢ Duration - <0.12 sec **QRS complex** ➢ It occurs due to ventricle contraction ➢ It represents ventricular depolarization ➢ The Q wave is the first negative deflection after the P wave.			

		➢ Duration – 0.04 sec ➢ The R wave is the first positive deflection after the P wave ➢ The S wave is the first negative deflection after the R wave ➢ When a wave is less than 5mm in height, small letters (q,r,s) are used, when a wave is taller than 5 mm , capital letters (Q,R,S) are used to label the waves ➢ Duration of QRS complex – less than 0.12 sec ➢ Narrow QRS – less than 0.07 sec (supraventricular origin) ➢ Broad QRS - >0.12 sec (ventricular origin) **T wave** ➢ Represents ventricular repolarization			

		➢ It follows the QRS complex and is usually the same direction as QRS complex ➢ Atrial repolarization also occurs, but is not visible on the ECG, because it occurs at the same time as ventricular depolarization (i.e., the QRS). **U wave** ➢ The U Wave is thought to represent repolarization of the Purkinje fibers ➢ This wave is rare. It sometimes appears in patient with hypokalemia, hypertension or heart disease. ➢ If presents the U wave follows the T wave and is usually smaller than P wave, if tall it may be mistaken for an extra P wave.			

		PR interval ➢ It is measured from the beginning of the P wave to the beginning of the QRS complex ➢ represent the time needed for sinus node stimulation, atrial depolarization, and conduction through the AV node before ventricular depolarization. ➢ Duration – 0.12-0.20 sec (3-5 boxes of small size) **ST segment** ➢ It represents early ventricular repolarization last from the end of the QRS complex to the beginning of the T wave (J POINT) ➢ The beginning of the ST segment is usually identified by a change in the thickness or an angle of the terminal portion of the QRS complex.			

		➢ The ST segment is normally isoelectric. ➢ Interval between ventricular depolarization and ventricular repolarization ➢ It is analyzed to identify whether it is above or below the isoelectric line, which may be, among other sign and symptoms, and a sign of Cardiac ischemia. **QT interval** ➢ It represents the total time for ventricular depolarization and repolarization. ➢ It is measured from the beginning of the QRS complex to the end of the T wave. ➢ Duration-0.32 sec to 0.40 sec if the heart rate is 65 to 95 bpm. ➢ Prolonged QT interval indicates, the patient may be at risk			

		for a lethal ventricular dysrhythmia called **torsade's de pointes.** ➢ Best visible in lead 2 & V5 and V6 **TP interval** ➢ It is measured from the end of the T wave to the beginning of the next P wave-an isoelectric period. ➢ When no electrical activity is detected, the line on the graph remains flat; this is called isoelectric line ➢ The ST segment is compared with the TP interval to detect ST segment changes. **PP interval** ➢ It is measured from the beginning of one P wave to the next P wave. ➢ The PP interval is used to determine atrial rate and Rhythm.			

		RR interval ➢ It is measured from the beginning of one QRS complex to the next QRS complex ➢ The RR interval is used to determine ventricular rate and rhythm.			
5 min	4. To describe the methods to determine heart rate from the electrocardiogram	1- One minute strip contains 300 large boxes and 1500 small boxes. Therefore, an easy and accurate method of determining heart rate with the regular rhythm is to count the number of small boxes within RR interval and divide 1500 by that number. 2- An alternative but less accurate method for estimating heart rate, which is usually used when the rhythm is irregular, is to count the number of RR intervals in 6 seconds and multiply	Lecture cum Discussion	PowerPoint presentation and information booklet	Describe the methods to determine heart rate, heart rhythm from the electrocardiogram

		that number by 10. The top of the ECG paper is usually marked at 3 seconds intervals, which is 15 large boxes horizontally. The RR intervals are counted rather than the QRS complexes because a computed heart rate based on the latter might be inaccurately high.			
30min	6.To explain the electrocardiogram interpretation of cardiac arrhythmias	**<u>Cardiac Arrhythmias</u>** **<u>Atrial flutter</u>** **Characteristic** **Ventricular and atrial rate-**ranges between 250-400 bpm; ventricular rate usually ranges between 75-150bpm **Ventricular and atrial rhythm-** the atrial rhythm is regular; ventricular rhythm is usually regular but may be irregular because of a change in the AV conduction	Lecture cum Discussion	PowerPoint presentation, and information booklet	Explain the electrocardiogram interpretation of cardiac arrhythmias

		QRS shape and duration- narrow QRS **P wave-** Saw-toothed shape; these waves are referred to as F waves **PR interval** – multiple F wave make it difficult to determine the PR interval **P:QRS ratio-** 2:1, 3:1, or 4:1 **<u>Atrial Fibrillation</u>** **Characteristic** **Rate-**atrial rate ranges between 300-600 bpm **QRS shape** narrow QRS **P wave-** absent P wave **PR interval** – cannot be measured **RR interval-** irregular **<u>Multi Focal Atrial Tachycardia</u>** **Characteristic** Rate->100 Rhythm – irregular			

		P waves- >3 different morphologies QRS complex narrow **<u>Paraoxysmal Supraventricular Tachycardia</u>** **Characteristic** Heart rate- 150-250 bpm; **QRS shape and duration-** narrow QRS complex **P wave**- usually very difficult to discern **PR interval** – Less than 0.12 sec **RR interval-** regular RR **P:QRS ratio**: 1:1 or 2:1 **<u>Ventricular Tachycardia</u>** **Characteristic** **Ventricular rate-** ventricular rate is 100 to 200 bpm **RR Interval-** regular **QRS shape and duration-** Broad QRS **P wave**- difficult to detect, so the atrial rate and rhythm may			

		be indeterminable **PR interval** – irregular, if P waves are seen **P:QRS ratio**: difficult to determine, but if P waves are apparent, there are usually more QRS complexes than P waves. **<u>Ventricular Fibrillation</u>** **Rate-** greater than 300 bpm **QRS shape and duration-** irregular, undulating waves without recognizable QRS complexes, unidentified QRS complex. **RR interval-** irregular RR **<u>Torsadus De Pointes (polymorphic ventricular tachycardia)</u>** **QRS Complex-** more than 3 types of QRS complexes twists around the base.			

		RR interval- irregular RR **QT interval** – long QT interval Alternating negative and positive deflection.			
15 min	7. To explain conduction abnormalities	**<u>Conduction Abnormalities First – degree AV block</u>** **Characteristic** It occurs when all the atrial impulse are conducted through the AV node into the ventricles at a rate slower than normal. **PR interval**- prolonged PR interval (≥0.20 sec), but no missed beats **P:QRS ratio** – 1:1 **<u>Second – Degree AV Block, Mobitz 1</u>** **Characteristic** **PR Interval-** The PR interval becomes longer with each succeeding ECG complex until there is P wave not followed	Lecture cum Discussion	PowerPoint presentation and information booklet	Explain conduction abnormalities

		by a QRS. The change in the PR interval is repeated between each "dropped" QRS, creating a pattern in the irregular PR interval measurement. **P: QRS ratio**- 3:2, 4:3, 5:4 and so forth **<u>Second – Degree AV Block, Mobitz II</u>** **Characteristic** **PR interval**- Fixed PR interval with dropped QRS beats **P: QRS ratio**- 2:1, 3:1, 4:1, 5:1, and so forth **<u>Third – Degree AV block</u>** **Characteristic** **PR interval**- Varying PR interval Atria and ventricles are contracting independently AV dissociation is seen **PP interval**- constant **RR interval**-			

		constant			

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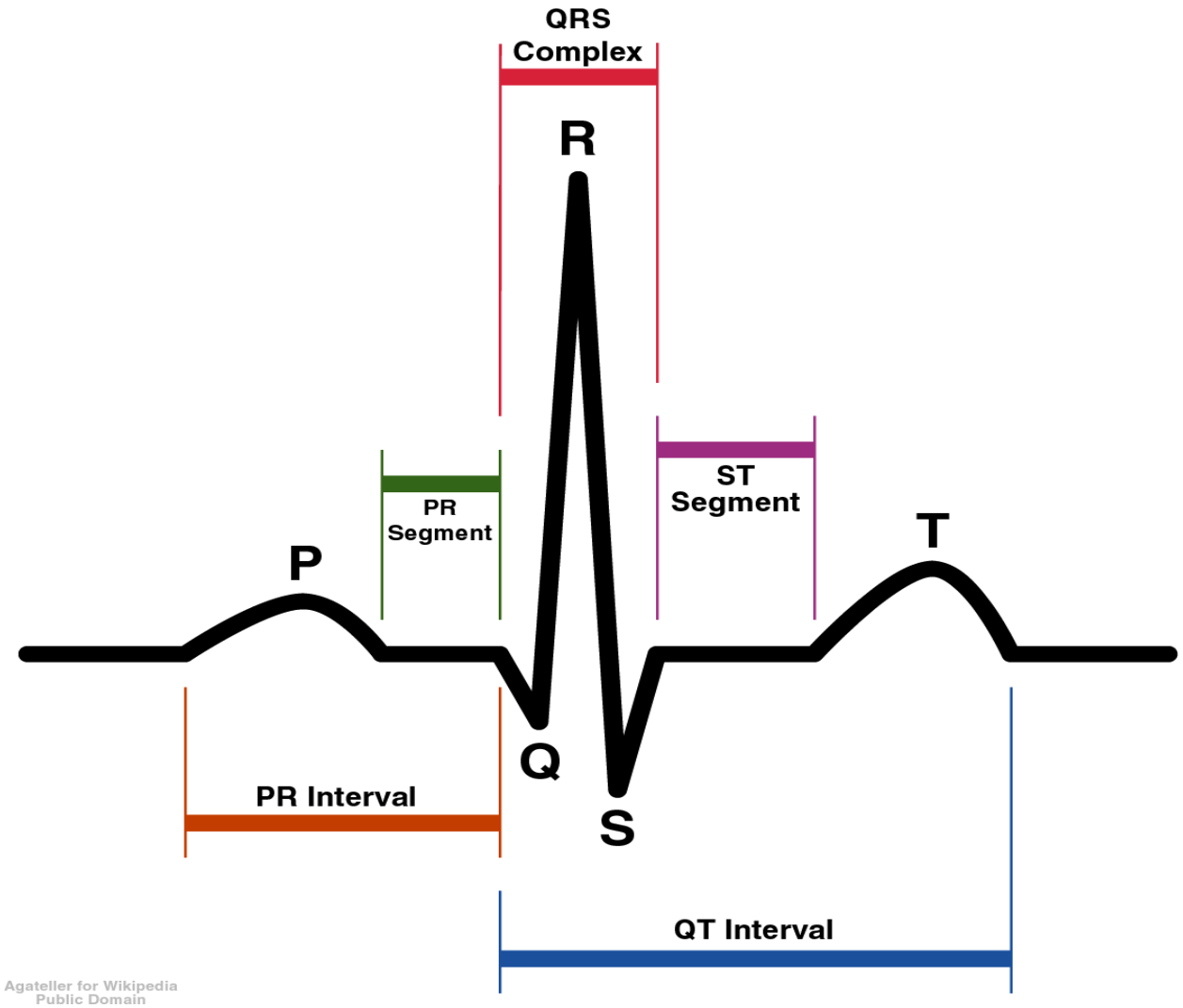
- Huszar R. Interpretation of EKGs: A Practical Approach for Health Professionals. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2012.
- American Heart Association. ECG Interpretation – Atrial Fibrillation. American Heart Association [Internet]. 2020. Available from: https://www.heart.org/-/media/files/health-topics/atrial-fibrillation-afib/ecg-afib-ucm_302021.pdf
- Goldberger AL, Goldberger ZD, Shvilkin A. Electrocardiography. In: Longo DL, Fauci AS, Kasper DL, Hauser SL, Jameson JL, Loscalzo J, editors. Harrison's Principles of Internal Medicine. 20th ed. New York: McGraw-Hill; 2018. p. 219-234.
- Brooks-Brunn JA. Postoperative atrial fibrillation: review of nursing management. Medsurg Nurs. 2005;14(5):281-288.

Content Of Information Booklet and Power Point on Knowledge Regarding Electrocardiogram Interpretation of Cardiac Arrhythmias

Electrocardiogram Interpretation of Cardiac Arrhythmias



ELECTROCARDIOGRAM

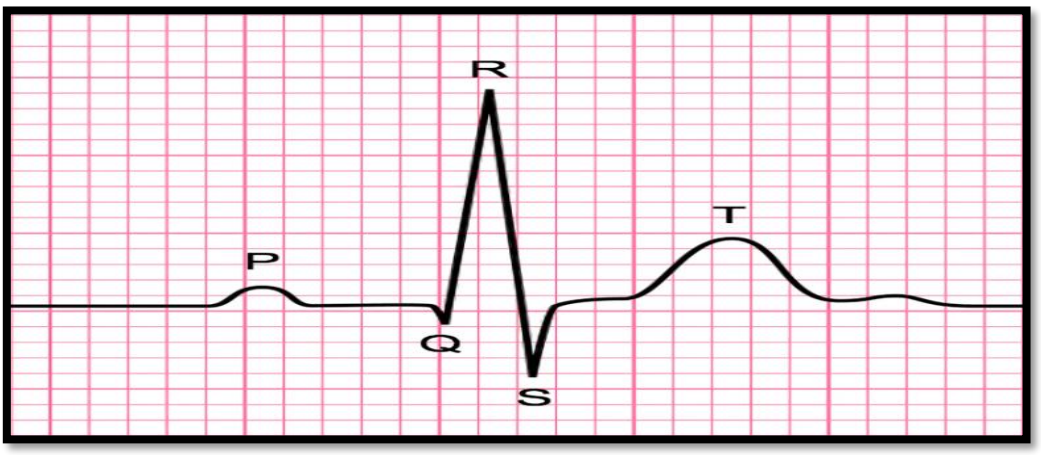
INTRODUCTION

Founder of ECG -WIILIAM EITHOVEN

The electrical impulse that travels through the heart can be viewed by means of electrocardiography, the end product of which is an electrocardiogram, or ECG. Each phase ofthe cardiac cycle is reflected by specific waveforms on the screen of a cardiac monitor or on astrip of ECG graph paper**.**

ECG WAVES AND COMPONENTS

- ECG waveforms are printed on graph paper that is divided by light and dark vertical and horizontal lines at standard intervals.
- **Time and rate are measured on the horizontal axis of the graph** and **amplitude or voltage is measured on the vertical axis.**
- When ECG waveforms move **towards the top of the paper, it is called positive deflection**. When it is moved towards the **bottom of the paper, it is called negative deflection.**
- The ECG is composed of waveforms, including the **P wave,** the **QRS complex,** the **T wave** and possibly a **U wave**, and of segments and intervals, including the **PR interval**, **ST segment**and **QT interval**



P wave

- First positive wave
- P waves occurs due to atrial contraction
- Represents atrial depolarization

- Height -2.5 mm or less
- Duration -<0.12 sec

QRS complex

- It occurs due to ventricle contraction
- It represents ventricular depolarization
- The Q wave is the first negative deflection after the P wave.
- Duration – 0.04 sec
- The R wave is the first positive deflection after the P wave
- The S wave is the first negative deflection after the R wave
- When a wave is less than 5mm in height, small letters (q,r,s) are used, when a wave istaller than 5 mm , capital letters (Q,R,S) are used to label the wave
- Duration of QRS complex – less than 0.12 sec
- Narrow QRS – less than 0.07 sec (supraventricular origin)
- Broad QRS ->0.12 sec (ventricular origin)

T wave

- Represents ventricular repolarization
- It follows the QRS complex and is usually the same direction as QRS complex
- Atrial repolarization also occurs, but is not visible on the ECG, because it occurs at thesame time as ventricular depolarization (i.e., the QRS).

U wave

- The U Wave is thought to represent repolarization of the Purkinji fibers
- This wave is rare. It sometimes appears in patient with hypokalemia, hypertension orheart disease.
- If presents the U wave follows the T wave and is usually smaller than P wave, if tall itmay be mistaken for an extra P wave.

PR INTERVAL

- It is measured from the beginning of the P wave to the beginning of the QRS complex
- represent the time needed for sinus node stimulation, atrial depolarization, and conduction through the AV node before ventricular depolarization.

- Duration – 0.12-0.20 sec (3-5 boxes of small size)

ST SEGMENT

- It represents early ventricular repolarization last from the end of the QRS complex to the beginning of the T wave (J POINT)
- The beginning of the ST segment is usually identified by a change in the thickness or an angle of the terminal portion of the QRS complex.
- The ST segment is normally isoelectric
- Interval between ventricular depolarization and ventricular repolarization
- It is analyzed to identify whether it is above or below the isoelectric line, which may be, among other sign and symptoms, and a sign of Cardiac ischemia.

QT INTERVAL

- It represents the total time for ventricular depolarization and repolarization.
- It is measured from the beginning of the QRS complex to the end of the T wave.
- Duration-0.32 sec to 0.40 sec if the heart rate is 65 to 95 bpm .
- Prolonged QT interval indicates, the patient may be at risk for a lethal ventricular dysrhythmia called **torsades de pointes.**

TP INTERVAL

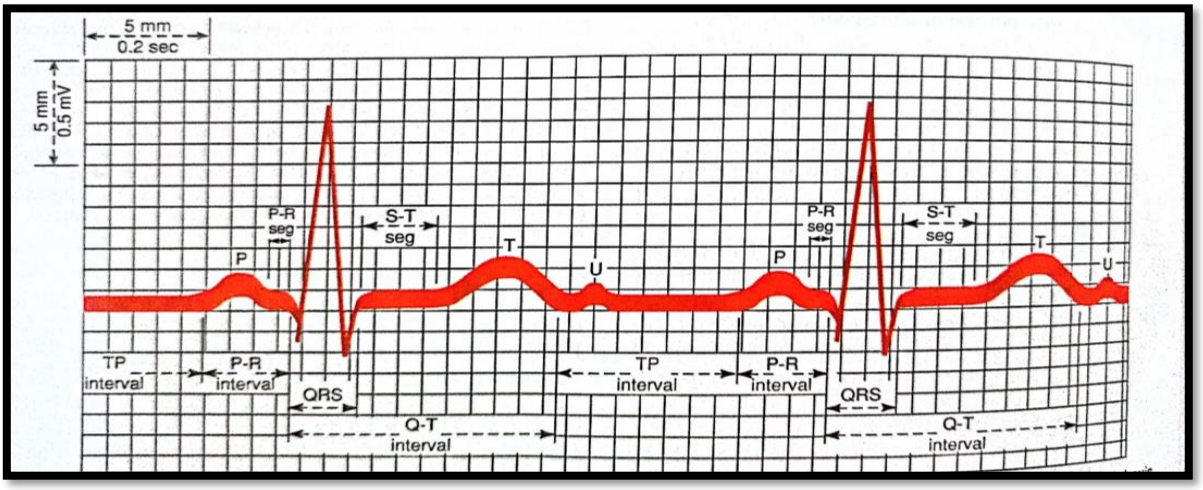
- It is measured from the end of the T wave to the beginning of the next P wave-an isoelectric period.
- When no electrical activity is detected, the line on the graph remains flat; this is called isoelectric line
- The ST segment is compared with the TP interval to detect ST segment changes

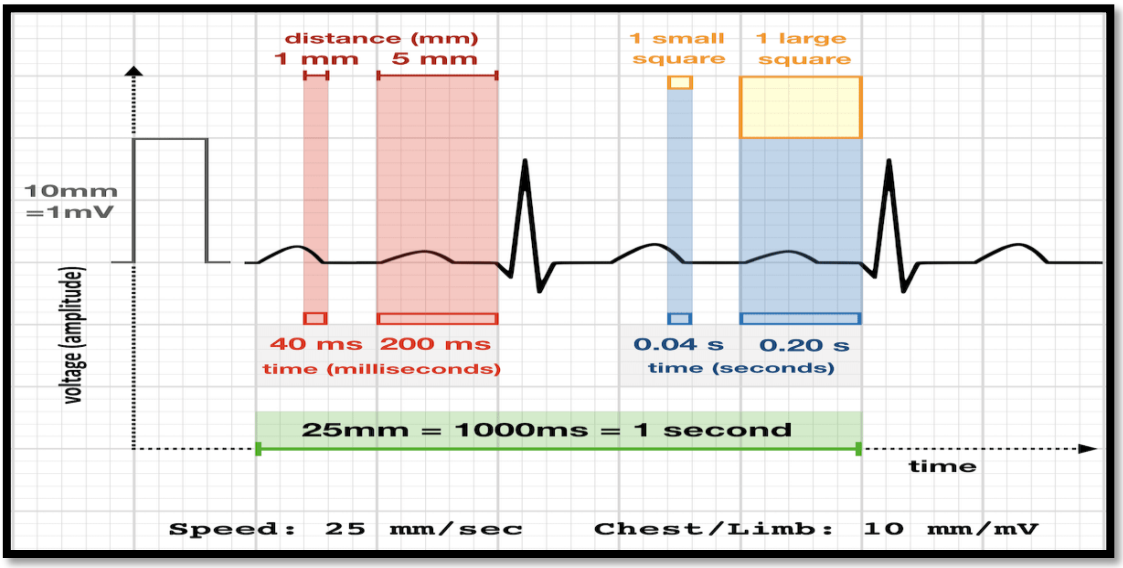
PP interval

- It is measured from the beginning of one P wave to the next P wave.
- The PP interval is used to determine atrial rate and Rhythm.

RR interval

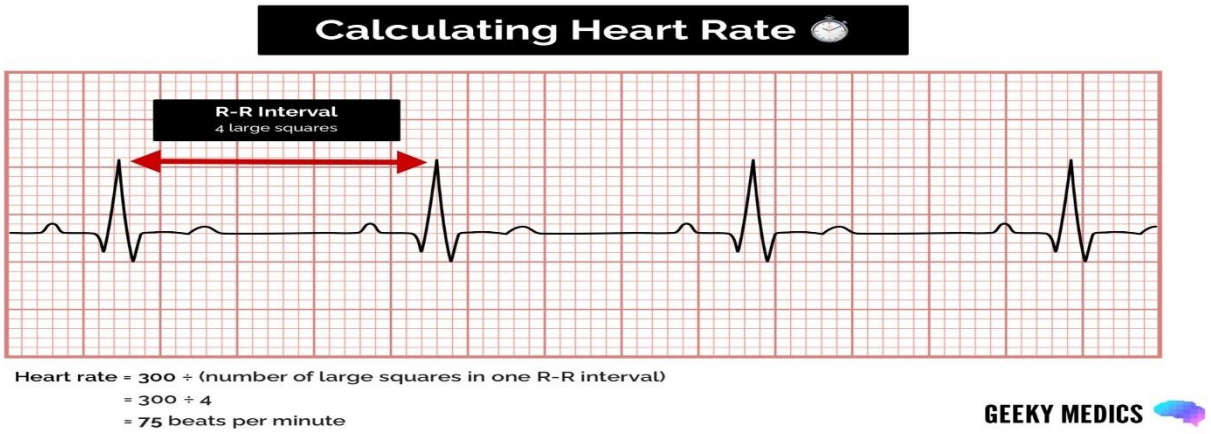
- It is measured from the beginning of one QRS complex to the next QRS complex
- The RR interval is used to determine ventricular rate and rhythm.



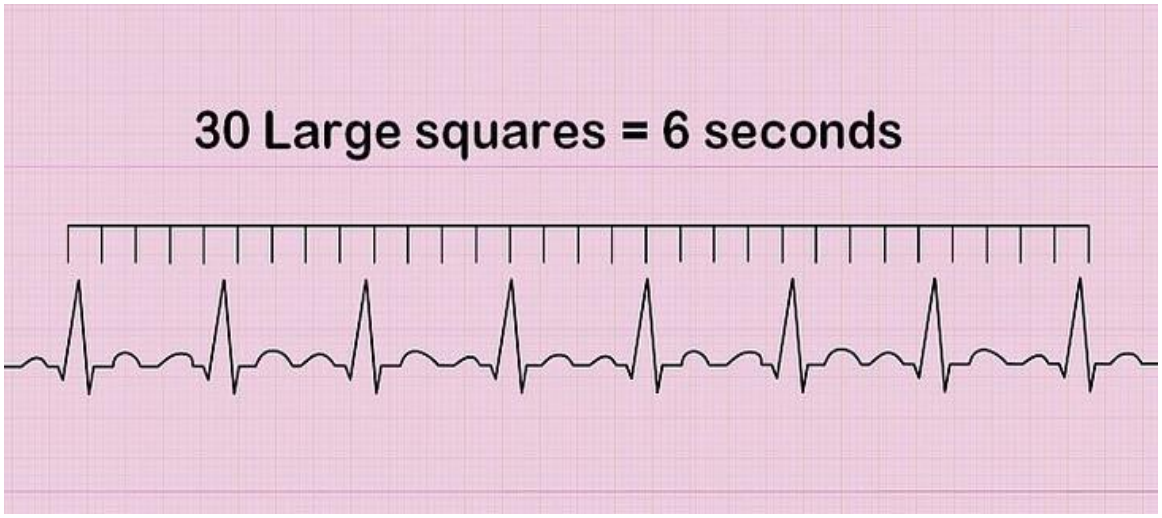


Rates and Rhythm

Divide 300 by the number of large boxes between R waves


Calculating Heart Rate
R-R Interval
4 large squares
Heart rate = 300 ÷ (number of large squares in one R-R interval)
= 300 ÷ 4
= 75 beats per minute
GEEKY MEDICS

If heart rate is less than 60 count the number of R waves in a 6 second strip and then multiply by 10.

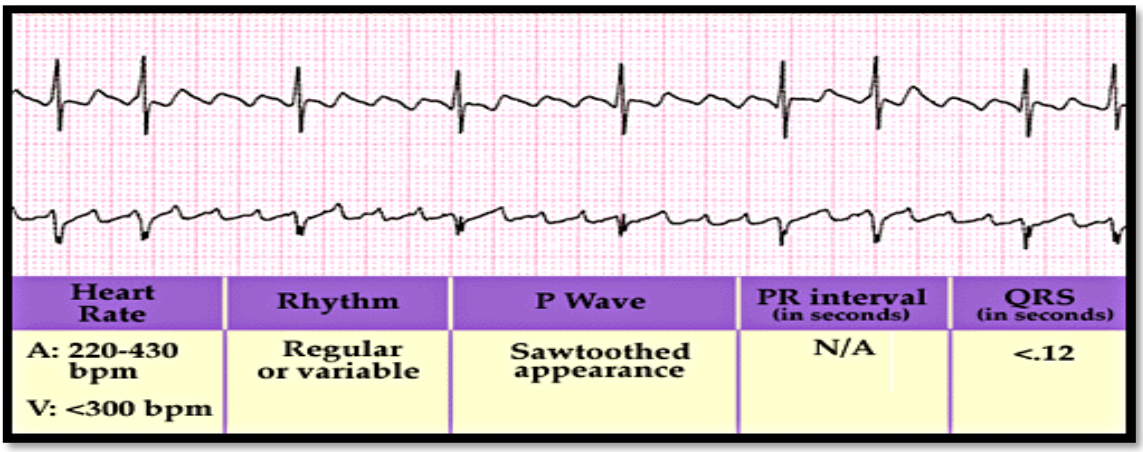


ATRIAL FLUTTER

Characteristic-

- **Ventricular and atrial rate-**ranges between 250-400 bpm; ventricular rate usually ranges between 75-150bpm
- **Ventricular and atrial rhythm**- the atrial rhythm is regular; ventricular rhythm is usually regular but may be irregular because of a change in the AV conduction
- **QRS shape and duration-** narrow QRS
- **P wave**- Saw- toothed shape; these waves are referred to as F waves

- **PR interval** – multiple F wave make it difficult to determine the PR interval
- **P:QRS ratio**- 2:1, 3:1, or 4:1



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
A: 220-430 bpm V: <300 bpm	Regular or variable	Sawtoothed appearance	N/A	<.12

ATRIAL FIBRILLATION

Characteristic

- **Rate-** Ranges between 300-600 bpm
- **QRS shape –** narrow QRS
- **P wave**- absent P wave
- **PR interval** – cannot be measured
- **RR interval**- irregular

Multi Focal Atrial Tachycardia

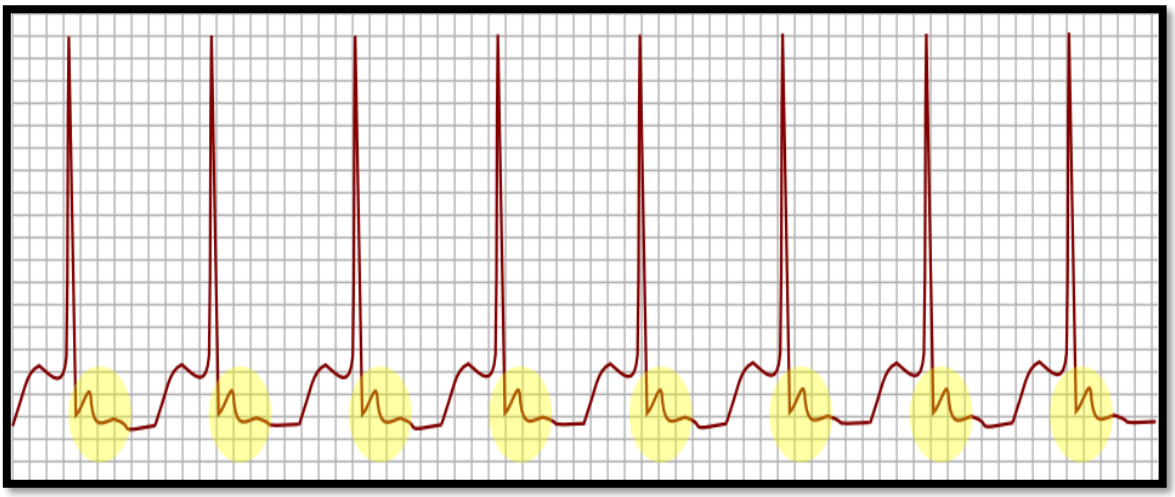
Characteristic-

- **Rate-**>100
- **Rhythm** – irregular
- **P waves-** >3 different morphologies
- **QRS complex-** narrow

Paroxysmal Supraventricular Tachycardia

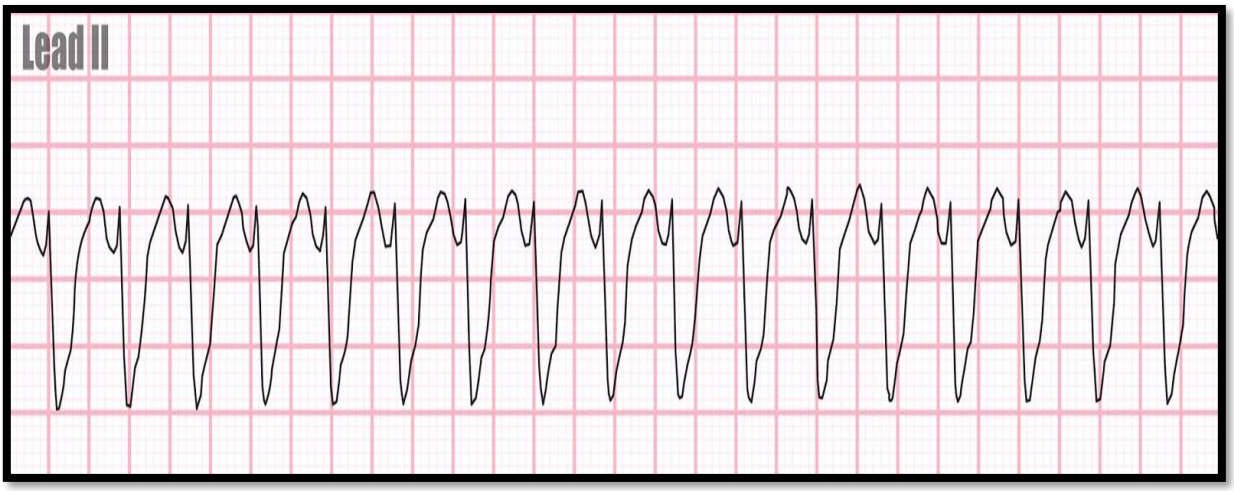
Characteristic

- **Heart rate-** 150-250 bpm
- **QRS shape and duration-** narrow QRS complex
- **P wave-** usually very difficult to discern
- **PR interval** – Less than 0.12 sec
- **RR interval-** regular RR



Ventricular Tachycardia
Characteristic

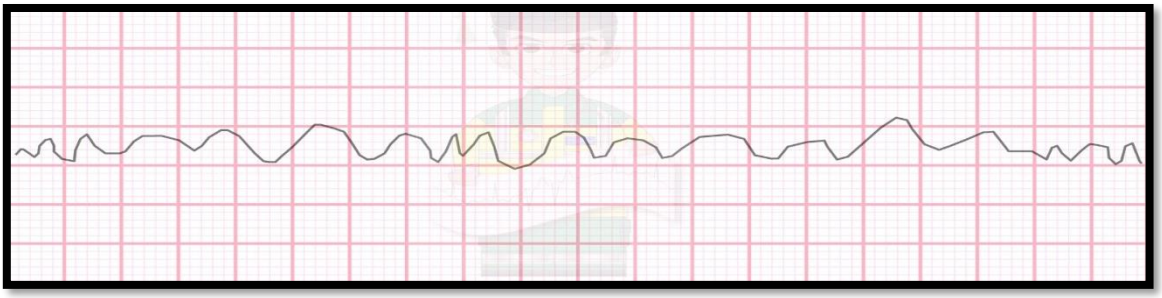
- **Rate-** ventricular rate is 100 to 200 bpm
- **RR Interval-** regular
- **QRS shape and duration-** Broad QRS
- **P wave-** difficult to detect, so the atrial rate and rhythm may be indeterminable
- **PR interval** – irregular, if P waves are seen
- **P:QRS ratio**: difficult to determine, but if P waves are apparent, there are usually more QRS complexes than P waves.



Ventricular Fibrillation

Characteristic-

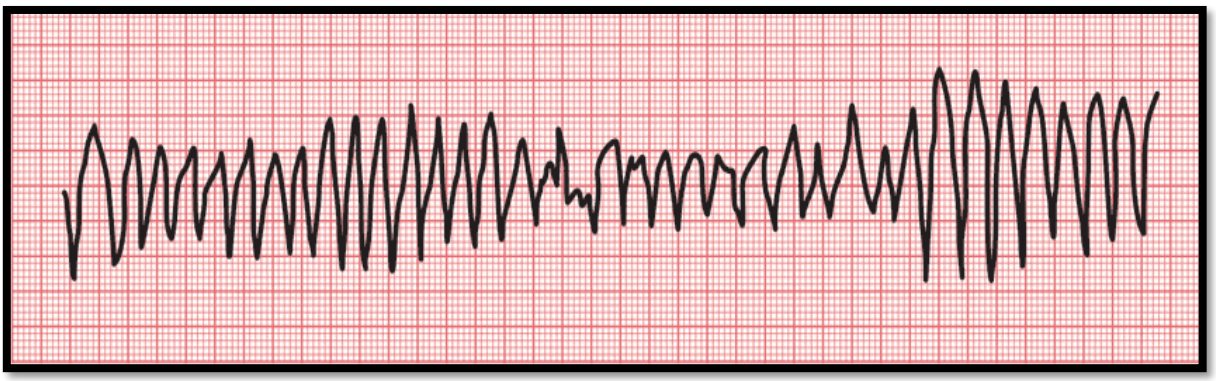
- **Rate-** greater than 300 bpm
- **QRS shape and duration-** irregular, undulating waves without recognizable QRS complexes, unidentified QRS complex.
- **RR interval-** irregular RR



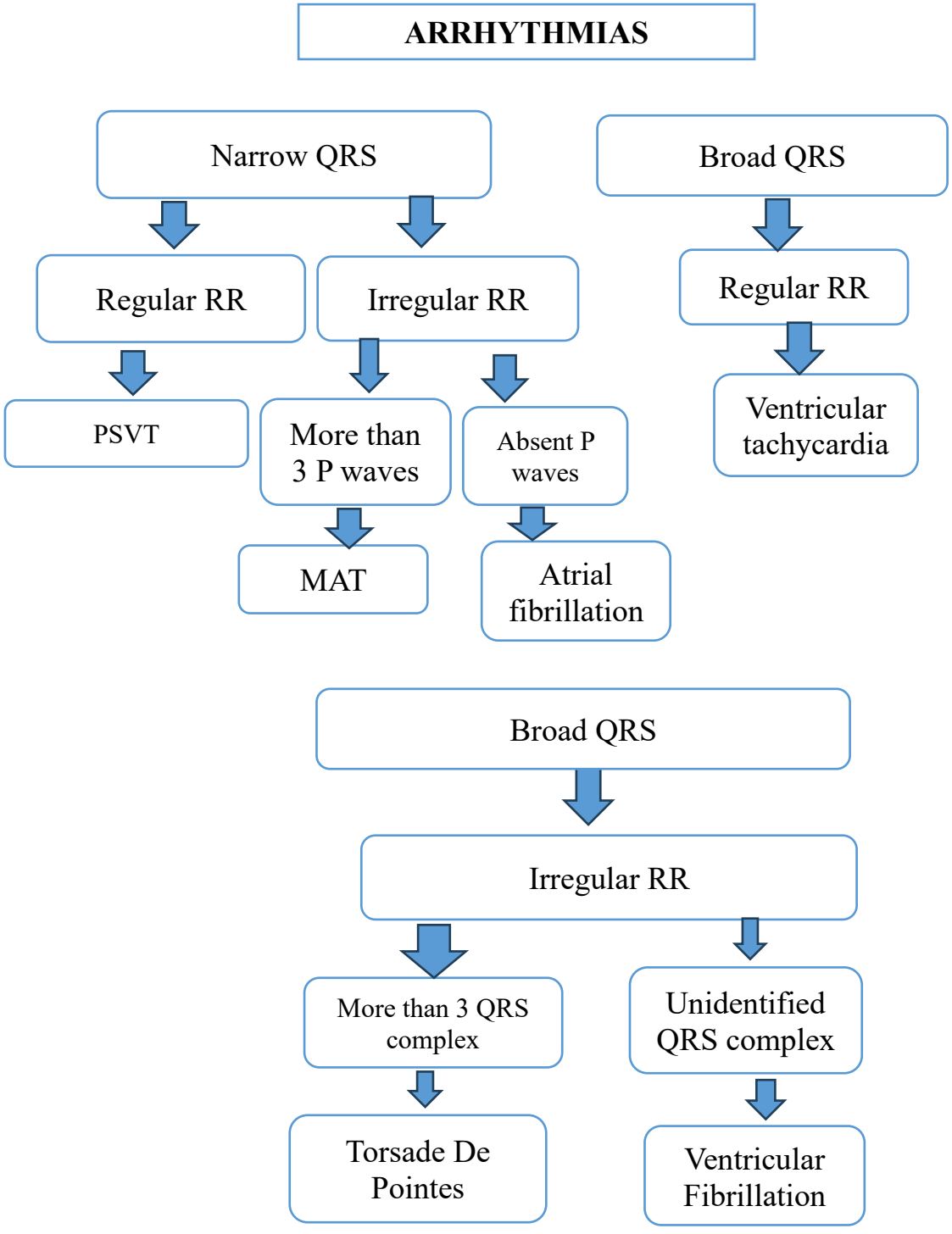
Torsade De Pointes

Characteristic-

- QRS Complex- more than 3 types of QRS complexes twists around the base.
- RR interval- irregular RR
- QT interval – long QT interval
- Alternating negative and positive deflection.



QUICK RECAP


ARRHYTHMIAS
Narrow QRS
Broad QRS
Regular RR
Irregular RR
Regular RR
PSVT
More than 3 P waves
Absent P waves
Ventricular tachycardia
MAT
Atrial fibrillation
Broad QRS
Irregular RR
More than 3 QRS complex
Unidentified QRS complex
Torsade De Pointes
Ventricular Fibrillation

Conduction Abnormalities

First – Degree AV Block

- It occurs when all the atrial impulse are conducted through the AV node into the ventricles at a rate slower than normal.
- **PR interval-** prolonged PR interval (≥0.20 sec), but no missed beats
- **P:QRS ratio –** 1:1

Mobitz Type I Second Degree AV Block Wenckebach Pattern

Characteristic

PR Interval-

- The PR interval becomes longer with each succeeding ECG complex until there is P wave not followed by a QRS.
- The change in the PR interval is repeated between each "dropped" QRS, creating a pattern in the irregular PR interval measurement.
- **P: QRS ratio-** 3:2, 4:3, 5:4 and so forth

Mobitz Type II Second Degree AV Block

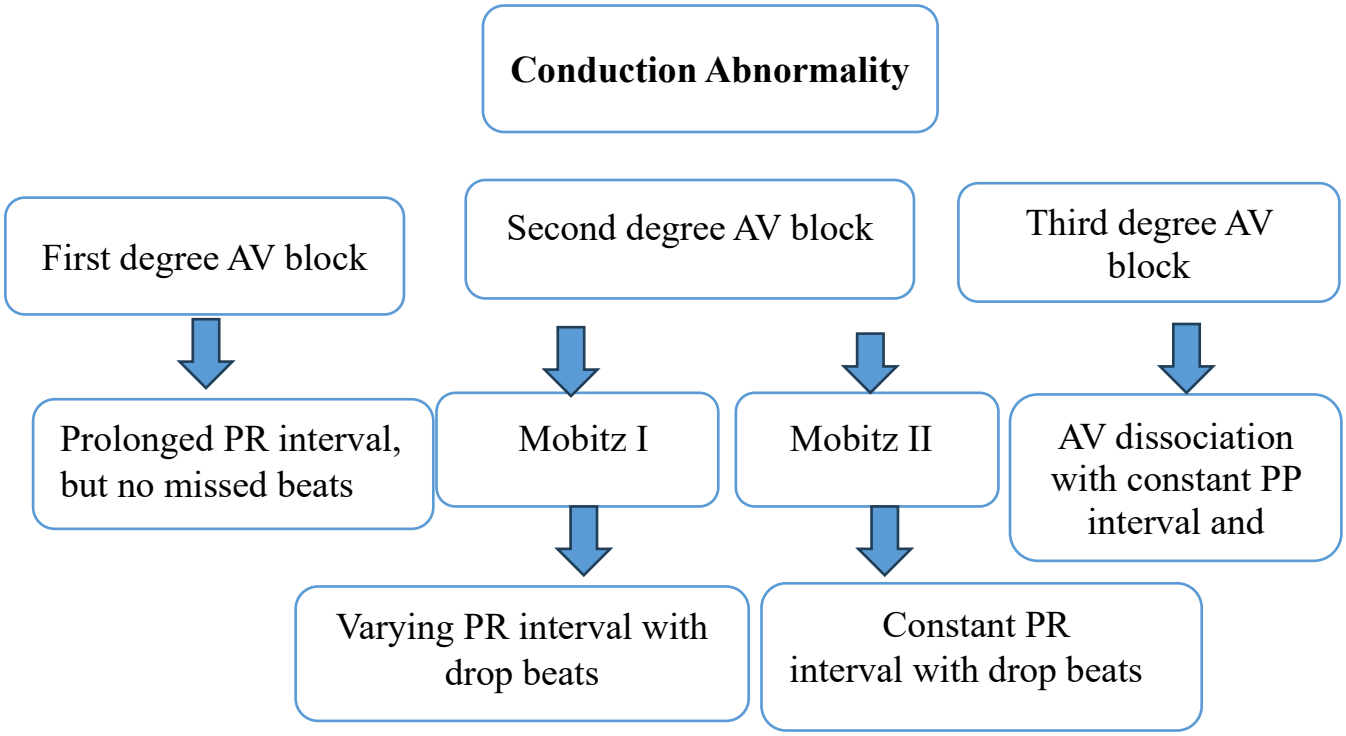
Characteristic-

- **PR interval-**
- Fixed PR interval with dropped QRS beats
- **P: QRS ratio-** 2:1, 3:1, 4:1, 5:1, and so forth

Third – Degree AV block

Characteristic-

- **PR interval-** Varying PR interval
- Atria and ventricles are contracting independently
- AV dissociation is seen
- **PP interval-** constant
- **RR interval-** constant


Conduction Abnormality
First degree AV block
Second degree AV block
Third degree AV block
Prolonged PR interval, but no missed beats
Mobitz I
Mobitz II
AV dissociation with constant PP interval and
Varying PR interval with drop beats
Constant PR interval with drop beats

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- Huszar R. Interpretation of EKGs: A Practical Approach for Health Professionals. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2012.
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ANNEXURE 6

LIST OF EXPERTS (TOOL AND INTERVENTION VALIDATIONS)

S.NO.	Name of the expert	Designation	Institution
1	Anil Kumar	Associate professor	University College of nursing BFUHS, Faridkot
2	Maneesh Sharma	Assistant professor	AIIMS Rishikesh
3	Dr. Neenunol K Jose	Associate professor	Jaganath Gupta institute of nursing science
4	Justin V Sebestian	Associate professor	Jaganath Gupta institute of nursing science
5	Dr. Radhika CK	Assistant professor	Govt. College of nursing Kottayam
6	Dr. Kishan Magatapalli	Associate professor (CTVS Department)	AIIMS Bhopal
7	Dr. Surendra Singh Yadav	Associate professor (CTVS Department)	AIIMS Bhopal
8	Mr. Kumarasamy AP	Assistant professor	Nursing College, AIIMS Bhopal
9	Ms. Ranjana Verma	Assistant professor	Nursing College, AIIMS Bhopal
10	Dr. Jisa George T	Assistant professor	Nursing College, AIIMS Bhopal

ANNEXURE 7

LETTER REQUESTING EXPERTS OPENIONS AND SUGGESTION FOR THE CONTENT VALIDTY

NURSING COLLEGE, OFFICE AIIMS, BHOPAL (M.P.)-462020
Received No. 11093
Date: 13/07/23

NURSING COLLEGE, OFFICE AIIMS, BHOPAL (M.P.)-462020
Dispatch No. 1041 3
Date: 24/7/23

DEAN (Nursing / Paramedics), Office AIIMS, BHOPAL (M.P.) 462020
Received No. 374
Date: 24/7/23

DEAN (Nursing/Paramedics), Office AIIMS, BHOPAL (M.P.) 462020
Dispatch No. 234
Date: 24/7/23

DRAFT **LETTER REQUESTING EXPERT'S OPINION AND SUGGESTIONS FOR THE CONTENT VALIDITY OF TOOLS**

From,
Dipali Singh
M.Sc. Nursing First year student
Nursing college, AIIMS Bhopal.

Date-.....

To,
.....
.....
.....

Subject: Requesting the expert's opinion and suggestions for the content validity of research tools

Respected Sir/ Madam,
I, Dipali Singh M. Sc. Nursing student in Medical Surgical Nursing (CTVS) at nursing college of AIIMS Bhopal, have selected the topic mentioned below for my dissertation to be submitted as partial fulfillment of Masters in Nursing Degree programme, at the nursing college, AIIMS Bhopal.
Topic: "An experimental study to evaluate the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS Bhopal.

In this regard I have prepared the following tools:

I) TOOL FOR DATA COLLECTION:
Section 1- Socio-demographic data
Section 2- Self-structured Knowledge questionnaire

II) INTERVENTIONAL PROTOCOL
Section 4- Lesson plan for electrocardiogram interpretation
Section 5-content of information booklet regarding electrocardiogram interpretation of cardiac arrhythmias

May I request you to kindly go through the content and give your valuable remarks and suggestions for any modification needed. I also please you to accept the request and sign the enclosed certificate of validation.
I shall be grateful to you for your valuable remarks and suggestions.

Thanking you in anticipation.
Yours sincerely,
Dipali Singh
M.Sc. Nursing First year student

GUIDE:
Dr. Anurag Bhai Patidar
Associate Professor
Nursing College
AIIMS Bhopal

CO-GUIDE:
Mr. Velmurugan R.
Assistant Professor
Nursing College
AIIMS Bhopal

आर. वेलमुरुगन/R. Velmurugan
सहायक प्राध्यापक/Assistant Professor
नर्सिंग महाविद्यालय/Nursing College
एम्स भोपाल मध्य प्रदेश-462020
AIIMS Bhopal, (M.P.)-462020

24/7/2023

Dr. Mamta Verma
I/C PRINCIPAL
Nursing College
AIIMS Bhopal

Enclosed with: Brief synopsis, Letter of permission, Research tool, Criteria checklist for content validity of the tool, Certificate of validation.

forwarded for kind
afformation
Dean N+P
24/7/23

ANNEXURE 8

Evaluation Criteria for Validation of Tool

Section A- Socio-Demographic variable

Items	Highly relevant (5)	Quiet relevant (4)	Somewhat relevant (3)	Not relevant (2)	remarks

Suggestions-

Section B- Self structured knowledge questionnaire to assess the knowledge regarding electrocardiogram interpretation of cardiac arrhythmias.

Items	Highly relevant (5)	Quiet relevant (4)	Somewhat relevant (3)	Not relevant (2)	remarks
1					
2					
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18					
19					
20					

Validation Checklist for content of information booklet and PowerPoint

S. No	Content	Agree	Disagree	Remarks
1	**Selection of content** • Adequate • Appropriate • accurate			
2	**Organization of content** • Organized • Logically • sequentially			
3	**Teaching learning activities** • Adequate • Relevant			
4	**Language** • Easy to understand • Simple • clear			

Suggestions-

ANNEXURE 9

CONTENT VALIDITY CERTIFICATE (TOOL)

CERTIFICATE OF VALIDATION

This is to certify that the tool prepared by Dipali Singh, M.Sc. Nursing 2022 batch student, Nursing college, AIIMS Bhopal, to be used in her study titled "**An experimental study to evaluate the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS Bhopal**" has been validated by me and is found to be **valid/ not valid.**

Overall Remark-

Signature:

Name of the expert:

Designation:

Name of the Institution:

Official seal:

Date:

Place:

ANNEXURE 10

Certificate of translation (Hindi)

CERTIFICATE OF TRANSLATION

TO WHOM IT MAY CONCERN

This is to certify that Ms. Dipali Singh, M.Sc Cardiological/Cardiothoracic Vascular Nursing student of Nursing College, AIIMS Bhopal is conducting research on topic "An experimental study to evaluate the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS Bhopal". The Hindi version of Research tool, Participant Information Sheet (PIS) and Participant Informed Consent Form (PICF) for this study is a true and accurate translation of the English version and is valid to collect data for research.

Seal & Signature : Jyoti JYOTI MALIK Ex. Principal P.L. Montessori [illegible] College, Lko.

Name of the language expert : JYOTI MALIK

Designation : MA, B.Ed. (Ex. Principal P.L. Montessori Inter College, LK

Qualification : M.A., B.Ed.

Date : 8/10/2023

Place : LUCKNOW

ANNEXURE 11

Participant Information Sheet (English)

STUDY TITLE An experimental study to evaluate the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS Bhopal.

STUDY INVESTIGATORS:

- **Student-** Dipali Singh, M.Sc. Nursing (2022-24 Batch), Nursing College, AIIMS Bhopal
- **Guide:** Dr. Anurag Bhai Patidar, Associate Professor, Department of Medical Surgical Nursing, Nursing College, AIIMS Bhopal
- **Co- Guide:** Mr. Velmurugan, Assistant Professor, Department of Medical Surgical Nursing, Nursing College, AIIMS Bhopal

Introduction: We are conducting a research study to assess the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS Bhopal. If you agree to take part voluntarily, we will ask you to sign a consent form.

1. **Purpose of the study:** The aim of our study is to assess the effectiveness of my intervention on the knowledge. This will help us find

2. **Taking part – what it involves:**

   a. **Do I have to take part?**

Participation in this research is entirely voluntary. A decision to not take part, or to withdraw at any time, will not affect your rights or medical care in any way.

   b. **What is expected of me if I take part?**

If you participate, we will provide you 60 min lecture cum discussion using PPT slides regarding electrocardiogram interpretation of cardiac arrhythmias and followed by giving out an information booklet.

How long will my part in the study last?

Your participation in the study would last for one week, in which you will be given lecture cum discussion using PPT slides and followed by giving an information booklet on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias and after one week you will be asked to come for assessment of knowledge.

   c. **Do I have to come for extra visits or undergo extra investigations for the study?**

Yes, you will be asked to come after one week of the intervention for assessment.

d. What are the possible benefits in taking part?

Taking part will help in gaining knowledge on electrocardiogram interpretation of cardiac arrhythmias which will help in early diagnosis and management of patient with cardiac arrhythmias .

e. What are the possible disadvantages and risks of taking part:

There are no major foreseeable disadvantages or risks because of the study. There may be risk of loss of privacy and confidentiality of information collected even though all possible measures will be taken to ensure safe data storage and access.

f. What happens to the information collected from me?

All information collected will be kept strictly confidential and not shared with anyone. Results from the study will be reported as group data and will not identify you in any way.

g. What if I change my mind regarding participation in the study?

You are entitled to change your mind and withdraw at any time during the study without any disadvantage or penalty.

h. Whom do I contact for more information or if I have further questions or concerns?

If you want any information or have questions or concerns, you can contact:

Ms. Dipali Singh

M.Sc. Nursing (2022-24) Batch
Medical Surgical Nursing,
Nursing College, AIIMS Bhopal
Email- DIPALIS.mscnursing22@aiimsbhopal.edu.in
Mobile-9555723254

Dr. Shashank Purwar
Member Secretary,
Institute Ethics Committee – Student Research
(7773010099, ihecpgr@aiimsbhopal.edu.in)

ANNEXURE 12

PARTICIPATION INFORMATION SHEET (HINDI)

प्रतिभागी सूचना पत्रक

अध्ययन शीर्षक एम्स भोपाल में नर्सिंग अधिकारियों के बीच कार्डियक अतालता की इलेक्ट्रोकार्डियोग्राम व्याख्या के बारे में ज्ञान पर नर्स के नेतृत्व वाले हस्तक्षेप की प्रभावशीलता का मूल्यांकन करने के लिए एक प्रायोगिक अध्ययन।

अध्ययन अन्वेषक:

• **छात्रा**-- दीपाली सिंह, एम.एससी. नर्सिंग (2022-24 बैच), नर्सिंग कॉलेज, एम्स भोपाल

• **मार्गदर्शक**: डॉ. अनुराग भाई पाटीदार, एसोसिएट प्रोफेसर, मेडिकल सर्जिकल नर्सिंग विभाग, नर्सिंग कॉलेज, एम्स भोपाल

• **सह-गाइड**: श्री आर. वेलमुरुगन, सहायक प्रोफेसर, मेडिकल सर्जिकल नर्सिंग विभाग, नर्सिंग कॉलेज, एम्स भोपाल

1.**परिचय**: हम एम्स भोपाल में नर्सिंग अधिकारियों के बीच कार्डियक अतालता की इलेक्ट्रोकार्डियोग्राम व्याख्या के बारे में ज्ञान पर नर्स के नेतृत्व वाले हस्तक्षेप की प्रभावशीलता का आकलन करने के लिए एक शोध अध्ययन कर रहे हैं। यदि आप स्वेच्छा से भाग लेने के लिए सहमत हैं, तो हम आपसे एक सहमति फॉर्म पर हस्ताक्षर करने के लिए कहेंगे।

2. **अध्ययन का उद्देश्य**: हमारे अध्ययन का उद्देश्य ज्ञान पर मेरे हस्तक्षेप की प्रभावशीलता का आकलन करना है। यह हमें खोजने में मदद करेगा

3. **भाग लेना** - इसमें क्या शामिल है:

a. **क्या मुझे भाग लेना है**?

इस शोध में भागीदारी पूरी तरह से स्वैच्छिक है। भाग न लेने या किसी भी समय वापस लेने का निर्णय किसी भी तरह से आपके अधिकारों या चिकित्सा देखभाल को प्रभावित नहीं करेगा।

b. यदि मैं भाग लेता हूँ तो मुझसे क्या अपेक्षा की जाती है?

यदि आप भाग लेते हैं, तो हम आपको कार्डियक अतालता की इलेक्ट्रोकार्डियोग्राम व्याख्या के बारे

में पीपीटी स्लाइड्स का उपयोग करके 60 मिनट का व्याख्यान सह चर्चा प्रदान करेंगे और उसके बाद एक सूचना पुस्तिका देंगे।

c. अध्ययन में मेरा हिस्सा कितने समय तक चलेगा?

अध्ययन में आपकी भागीदारी एक सप्ताह तक चलेगी, जिसमें आपको पीपीटी स्लाइड्स का उपयोग करते हुए व्याख्यान सह चर्चा दी जाएगी और उसके बाद कार्डियक अतालता की इलेक्ट्रोकार्डियोग्राम व्याख्या के बारे में ज्ञान पर एक सूचना पुस्तिका दी जाएगी और एक सप्ताह के बाद आपको मूल्यांकन के लिए आने के लिए कहा जाएगा। ज्ञान की।

d. क्या मुझे अध्ययन के लिए अतिरिक्त मुलाकातों या अतिरिक्त जांचों के लिए आना होगा?

हां, आपको हस्तक्षेप के एक सप्ताह बाद मूल्यांकन के लिए आने के लिए कहा जाएगा।

e. भाग लेने के संभावित लाभ क्या हैं?

भाग लेने से कार्डियक अतालता की इलेक्ट्रोकार्डियोग्राम व्याख्या पर ज्ञान प्राप्त करने में मदद मिलेगी जो कार्डियक अतालता वाले रोगी के शीघ्र निदान और प्रबंधन में मदद करेगी।

f. भाग लेने के संभावित नुकसान और जोखिम क्या हैं:

अध्ययन की वजह से कोई बड़ा अनुमानित नुकसान या जोखिम नहीं हैं। एकत्र की गई जानकारी की गोपनीयता और गोपनीयता के नुकसान का जोखिम हो सकता है, भले ही सुरक्षित डेटा भंडारण और पहुंच सुनिश्चित करने के लिए सभी संभव उपाय किए जाएंगे।

g. मुझसे एकत्र की गई जानकारी का क्या होता है?

एकत्र की गई सभी सूचनाओं को कड़ाई से गोपनीय रखा जाएगा और किसी के साथ साझा नहीं किया जाएगा। अध्ययन के परिणाम समूह डेटा के रूप में रिपोर्ट किए जाएंगे और किसी भी तरह से आपकी पहचान नहीं करेंगे।

h. क्या होगा अगर मैं अध्ययन में भाग लेने के बारे में अपना विचार बदल दूं?

आप अपना विचार बदलने और अध्ययन के दौरान किसी भी समय बिना किसी नुकसान या दंड के वापस लेने के हकदार हैं।

एच। अधिक जानकारी के लिए या मेरे और प्रश्न या चिंताएँ होने पर मैं किससे संपर्क करूँ?

यदि आप कोई जानकारी चाहते हैं या आपके कोई प्रश्न या चिंताएँ हैं, तो आप संपर्क कर सकते हैं:

दीपाली सिंह
एमएससी नर्सिंग (2022-24) बैच
मेडिकल सर्जिकल नर्सिंग,
नर्सिंग कॉलेज, एम्स भोपाल
ईमेल- DIPALIS.mscnursing22@aiimsb
मोबाइल - 9555723254

डॉ. शशांक पुरवार
सदस्य सचिव,
संस्थान आचार समिति - छात्र अनुसंधान
(7773010099,
ihecpgr@aiimsbhopal.edu.in)

ANNEXURE 13

PARTICIPANT INFORMED CONSENT FORM (PICF) (English)

Participant Identification Number for this Study: ……
Title of Project: An experimental study to evaluate the effectiveness of nurse led intervention on knowledge regarding electrocardiogram interpretation of cardiac arrhythmias among nursing officers at AIIMS Bhopal.

Name of Student Investigator: Ms. Dipali Singh
Tel No.(s): 9555723254
Name of Thesis Guide: Dr. Anurag Bhai Patidar
The contents of the information sheet version II dated 20 August 2022 that was provided have been read carefully by me / explained in detail to me, in a language that I comprehend, and I have fully understood the contents. I confirm that I have had the opportunity to ask questions.
The nature and purpose of the study and its potential risks/benefits and expected duration of the study, and other relevant details of the study have been explained to me in detail. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal right being affected.

I understand that the information collected about me from my participation in this research and sections of any of my medical notes may be looked at by responsible individuals from AIIMS. I give permission for this individual to have access to my records.

If participants is child, his/her verbal of written assent has been obtained.
I agree to take part in the above study.

_____
(Signature/Left Thumb Impression)

Date…… Place …….....
Name of the participant…….....
Son/Daughter/Spouse of…….
Complete Postal Address ……...
If illiterate.
The information sheet has been read and explained to the participant and given the opportunity to ask questions.
I confirm that the individual has given consent freely.

_____
Signature of Legally acceptable representative or impartial witness.
Date:
Name of LAR or impartial witness:
Address:
This is to certify that the above consent has been obtained in my presence.

_____

Signature of the student Investigator Date …… Place……

NB: Three copies should me made, for (1) Patient, (2) Researcher, (3) Institution (Students are requested to prepare the translation in simple understandable Hindi on their own.)

ANNEXURE 14

PARTICIPANT INFORMED CONSENT FORM (PICF) (Hindi)

<u>प्रतिभागी सूचना सहमति प्रपत्र</u>

इस अध्ययन के लिए प्रतिभागी का पहचान नंबरः .....

अनुसंधान का शीर्षकः एम्स भोपाल में नर्सिंग अधिकारियों के बीच कार्डियक अतालता की इलेक्ट्रोकार्डियोग्राम व्याख्या के बारे में ज्ञान पर नर्स के नेतृत्व वाले हस्तक्षेप की प्रभावशीलता का मूल्यांकन करने के लिए एक प्रायोगिक अध्ययन।

शोधकर्ता छात्र का नाम : दीपाली सिंह, फोन नं: 9555723254
शोध मार्गदर्शक का नाम : डॉ. अनुराग भाई पाटीदार

मैंने दिनांक 20.08.2022 के सूचना पत्रक संस्करण ॥ में दिए गए सभी तथ्यों को सावधानीपूर्वक पढ़ लिया है/ मुझे अपनी भाषा में स्पष्ट रूप से विस्तारपूर्वक समझा दिया गया है, और मैंने तथ्यों को पूर्णतः समझ लिया है। मैं पुष्टि करता/ करती हूँ, कि मुझे सवाल पूछने के अवसर प्रदान किए गए।
मुझे इस अध्ययन की प्रकृति एवं उद्देश्य और इसके संभावित जोखिमों / लाभों तथा अध्ययन की अनुमानित अवधि एवं अन्य प्रासंगिक जानकारी के बारे में विस्तारपूर्वक समझा दिया गया है। मुझे पता है कि इस अध्ययन में मेरी भागीदारी स्वैच्छिक है तथा मैं इस अध्ययन से किसी भी समय बिना कोई कारण बताए, अपना नाम वापस लेने के लिए स्वतंत्र हूं और नाम वापस लेने पर मेरी चिकित्सा देखभाल या कानूनी अधिकारों पर कोई प्रभाव नहीं पड़ेगा।
मैं समझता/समझती हूं कि इस अनुसंधान में मेरी भागीदारी से मेरे बारे में एकत्र की गई जानकारी और मेरे चिकित्सीय दस्तावेजों के किसी भी भाग को एम्स के जिम्मेदार व्यक्तियों द्वारा ही देखा जाएगा। मैं इन व्यक्तियों को मेरे रिकॉर्ड प्राप्त करने की अनुमति प्रदान करता/ करती हूँ।
यदि प्रतिभागी बच्चा है तो उसकी मौखिक या लिखित सहमति प्राप्त की गई है।
मैं उक्त अध्ययन में भाग लेने के लिए सहमत हूं/

_____
(प्रतिभागी के हस्ताक्षर / बांए अंगूठे का निशान)
दिनांक..... स्थान.....
प्रतिभागी का नाम.....
पिता/पति/पत्नी का नाम.....
डाक का पूरा पता.....
अगर अशिक्षित हों
सूचना पत्र को प्रतिभागी को पढ़ा और समझाया गया है और प्रश्न पूछने का अवसर दिया गया है। मैं पुष्टि करता हूं कि व्यक्ति ने स्वतंत्र रूप से अपनी सहमति दी है ।
कानूनी रूप से स्वीकार्य प्रतिनिधि या निष्पक्ष गवाह के हस्ताक्षर
दिनांक.....
एलएआर या निष्पक्ष गवाह का नाम:
पता:
प्रमाणित किया जाता है कि उक्त सहमति मेरी उपस्थिति में प्राप्त की गई ।

_____
छात्र शोधकर्ता के हस्ताक्षर दिनांक..... स्थान.....

ANNEXURE 15

MASTER DATA SHEET

Allocation	Group 1- experimental		
	Group 2- control		
Sr. no.	variable	option	Option Code number
A.	Age	• 21-25 years • 26-30 years • 31-35 years • >35 years	1 2 3 4
B.	Gender	• Male • Female	1 2
C.	years of working experience as registered nurse	• <1 years • 1-5 years • 5-10 years • >10 years	1 2 3 4
D.	Currently working unit in hospital	• General ward/Medical ward • Surgical wards • Emergency department • Intensive care unit • others	1 2 3 4 5
E.	Educational level	• General nursing and midwifery • Post basic certificate • BSc nursing • MSc nursing /M. Phil/PhD	1 2 3 4
F.	Do you take ECG for patient	• Yes • No	1 2
G.	Have you undergone any ECG interpretation training	• Yes • No	1 2
H.	ECG education resources	• Courses • University • Internet • Self -learning books • Conference	1 2 3 4 5

Group	A	B	C	D	E	F	G	H	Pre test	Post test
1	1	2	2	1	3	1	2	4	10	15
1	1	1	2	1	3	1	`1	4	11	17
1	1	1	3	1	2	1	2	4	12	18
1	2	2	2	1	3	1	2	4	11	17
1	2	1	3	1	3	1	2	4	12	18
1	2	1	2	1	3	1	1	1	5	13
1	1	2	1	1	2	1	2	4	12	18
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